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General

Cotton

Wool

Rayon

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Knitting

Process in

Engineering

Follow the labelled thumb guides to refer to any section

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ANNUAL REVIEW AND FORECAST NUMBER

Textile World

February 28, 1936

*Editor:* DOUGLAS G. WOOLF

General

# TUNING UP FOR BETTER PROFITS

WE are giving away free, with each copy of this Annual Review and Forecast Number, some inside stuff. Here it is:

In recent years we have had the opportunity to observe the methods of several "industrial doctors" in the textile industry. These men, as our readers know, are put in charge of sick properties, usually by banks, in an attempt to convert a loss into a profit. We don't suppose all members of this profession are good, but it just happens that those we have observed **are** good, without exception.

We have found a striking similarity in their lines of approach. What they do is to reduce the problem to its simplest terms—and then to attack each phase, in turn, directly and decisively, without sentimental inhibitions. That last phrase, of course, gives the real secret of their success.

Stealing their stuff still further, here's about the order of investigation they pursue:

1. Salability of product.
2. Rate of inventory turnover.
3. Efficiency of operation.

**1. Salability of product:** Most of us have the tendency to assume that the product we are making and selling is all right. It's a dangerous assumption. Often the major market for a product dwindles for years before the manufacturer seems to realize it. The "industrial doctors" we have watched don't take anybody's word for this. They wade right in and find out: not only whether a product can be sold, but how stiff its competition is, what chance there is for a profit, and what product or products, if any, might be better for the organization in question to make. Some of the things they find out are exciting. They may learn that the pet line of the company is its major source of loss—or, on the contrary, that its sidelines are draining its resources. They may discover that the company should get out of the finished goods business—or, in another case, get into it. Once learned, the lesson is applied.

**2. Inventory turnover:** Talk to one of these "doctors" about a job he is doing and it won't be long before he'll show you a chart illustrating the inventory control he has put into effect. One of them said to us in despair: "Textile manufacturers pride themselves on being smart business men but most of them don't seem to know the first thing about the cost of static inventory." What these medical men do is to arrange to turn over the inventory the maximum number of times a year—a simple little trick which is the fundamental of good retailing, but generally neglected in manufacturing. Often, this consideration necessitates further change in the product itself.

**3. Efficiency of operation:** Having assured himself that the product is right and that it is being moved fast enough, the "doctor" turns his attention to its production. This, of course, becomes his major job. It means, usually, a complete "house-cleaning"—and often a radical shrinking of the property. Efficient equipment is concentrated in the satisfactory buildings — and the rest of the equipment is scrapped and the excess plant sold. Each step in the operation is gone over carefully, in order, and modernized and "tuned up" to the efficiency of the organization as a whole.

And yet, strange as it may seem, these "industrial doctors" are not hard-boiled. They don't discharge personnel ruthlessly; in fact those men who get in step with the new regime soon find that they have more interesting jobs and broader opportunities than before.

We've told you how these men work. To apply this lesson, you don't even have to hire one of them. All you have to do is (1) to get over the idea that it just can't be done in your case, and (2) overcome sentimental attachments for old products, old methods and old machines.

Then you're all set for "Tuning Up for Better Profits"—which, incidentally, is the theme-song of this Annual Number.

Douglas G. Woolf

# THE YEAR IN TEXTILES

FORMULA: To duplicate 1935 as a textile year, take 2 parts discarded NRA, 2 parts void AAA, 1 part Japanese competition, 3 parts stagnation, 5 parts boom; shake well, add a dash of wage-differential controversy, ice, and serve.

If the patient lives, it's the textile industry. The patient **did** live, so it **is** the textile industry. Poor old decrepit, decadent textile industry! Backward, anti-social, reactionary, it is called. Shades of emaciated children creeping at dawn into textile mills! Visions of over-worked operatives fainting at their machines!

And yet this cripple of an industry, even in the amazing year of 1935, continued to give more employment, at a proportionately greater increase in wage-rate and decrease in length of work-week—as compared with its norm—than probably any other major industry in the country. And all this, incidentally, on an entirely voluntary basis during the last seven months of the year.

**That** is the textile industry.

So let's look over its 1935 record and 1936 prospect.

## GRIEF

IT ALL STARTED with the liquidation of certain properties, mostly New England. These events had been in the cards for some time but they broke almost simultaneously. Communities affected first got the jitters—then became panicky. Chambers of Commerce publicized their grief in as big a way as they once gloated over their triumphs. Processing taxes, Japanese competition, and wage-differential were made the focal points of attack.

The scene shifted to Washington. Congressmen and Congresswomen picked up the ball and started to make political capital out of the textile situation. It looked bad, for a while. Cabinet Committee started hearings. The plot thickened.

Then along came the Supreme Court. Death of NRA overshadowed the private textile "crisis." Subsequently, as an anti-climax, the Cabinet Committee said "no" on the two items that counted, and "yes" on the things that didn't count.

But by that time business was picking up, so nobody cared.

## RECOVERY

AND HOW it did pick up!

Early in August we wrote, for these columns: "**Prophecy:** Textiles are on the verge of an upward move. It looks like a good fall, in both activity and prices. We have a hunch that, by the time our next issue appears, this view will have become generally accepted. In fact, this is more than a hunch; all signs point that way. So hold on tight!"

Some of our friends told us we were crazy. But we weren't.

Net result: Total textile mill activity for 1935 some 17% up on 1934; welcome signs of price sanity appearing in several branches of the industry; and a generally prettier picture all around.

## NRA

WE BELIEVE the news has leaked out that, on May 27 last, the Supreme Court threw the NRA out of the window.

For the textile industry, it looked like plenty of trouble ahead. Visions of wholesale wage-cuts, with lengthening of shifts, foreshadowed chaos. But that's just what didn't happen. The industry pulled up its socks, as one of the more elegant expressions goes, and gave a fine illustration of a fighting group, prepared to hold its gains against all comers. Which it did—to the tune of 90-odd per cent conformance, on the average. Subsequently, certain branches took steps to get this policy set down more formally as signed voluntary agreements—and this effort is now progressing.

We almost forgot Major Berry! Which isn't strange, because we find that most of the industry has. Well, in any event, the Major tried to revive NRA last fall—and, when it just wouldn't revive, he proceeded to get tough about it. But even that didn't help, and the Berry performance, if remembered at all, is recalled as one of the cruder jokes. . . . . We imagine Mr. Berry feels now as did the prominent citizen in a story we heard recently. One evening, he dined and wined too well—and on the way home he picked up a stone and hurled it through a plate-glass window. Next morning, in police court, the Judge—an old friend of the prisoner—leaned over sadly and said: "George (it really was George as we got this story) you're a respected member of this community. Whatever made you throw that stone through that window?" "Judge," replied George thoughtfully, "I can't quite seem to recall this morning—but I'm sure I must have had a big idea last night."

## AAA

MEANWHILE, storm - clouds gathered around AAA. In fact, Secretary Wallace was in about as tight a spot all during 1935 as any man in recent history. His chief trouble is that he can't make you feel sorry for him; on the contrary, everything he says makes you want to put the screws on a little harder. Too bad, because he happens to be sincere to the point of fanaticism.

The first big thunder-bolt was shot in Boston on July 16 when the U. S. Circuit Court of Appeals, in its decision on the Hoosac Mills case, declared the processing tax unconstitutional. The Supreme Court's decision on Jan. 6 just missed the 1935 chronology—but really belongs in the record of that year.

It would be unpleasant and unnecessary to review the headaches accruing to the textile industry from that decision. The whole show was a glorious demonstration of that classic remark: "You're going to be much worse before you're better."

The industry got worse—and now it's getting better.

## LABOR

IN CONTRAST to those turbulent days in the fall of 1934, the early part of 1935 was quiet on the labor front. Then the U. T. W. went gunning after some of the New England woolen and worsted mills. Later came the Pelzer tragedy, the Strutwear fiasco, and others.

Overshadowing strikes, however, were two broad developments: the launching of the Ellenbogen bill, and the activities of the National Labor Relations Board. The former is now generally conceded to be dead; the latter is very much alive. The Supreme Court may kill it; if not, it will rate high in nuisance-value during 1936.

So much for management-union contacts. Employer-employee relationships are something else again. They are on a better basis right now than for years past. And why not? High rate of employment, at increased wages but shorter work-week, is an in-the-pocket argument that is hard to beat. Most workers are taking the stand that "we'll play these, thank you."

## MISCELLANY

HERE ARE a few of the technical developments of the year picked at random from our files: Continuous viscose spinning; adoption of S and Z twist designation; "Frosted Wool" process for removing impurities; further perfection of the finish—moth-, shrink-, crease- and water-proofing; "Fiber-Bonding" to increase durability of fabrics; use of polarized light to determine degree of fibre maturity in cotton. These are just samples.

And some of the outstanding fabrics and products of the year: matelasse (a carry-over); tinsel fabrics; "jockey shorts"; honeycomb weaves; knee-length hosiery; seeds; shantung; satin; velvets (credited to the Mae West influence) and embossed velvets; cotton-string knitting—oh, well, this has to stop somewhere. And, as an afterthought, midnight-blue dinner coats, and wine and green colored hosiery.

And look up the record of some of these 1935 trends and events when you have a free evening:

Japanese competition. . . . . Brazilian textile boom. . . . . Increase in textile industries in many other countries, previously largely non-industrial. . . . Growth of staple-fiber use in Italy and Germany, due to national economic situations. . . . . Remarkable come-back of wool industry. . . . . Recovery in raw silk price. . . . . Work-assignment report. . . . . Philippine agreement. . . . . Amoskeag report. . . . . Worth Street rules. . . . . Wool promotion started. . . . . Glass textiles.

It all adds up to quite a year, doesn't it?

THE EDITOR

## What will the industry do about these in 1936?

ONE accomplishment stands out above all other textile achievements in 1935: the voluntary maintenance of basic code provisions after the Supreme Court decapitated NRA. That did more than any other one thing to restore confidence within the industry itself, to regain public approval for the industry, to strengthen hitherto wobbly price levels, and to convert a disastrous year into at least a partially successful one.

Obviously, then, the fate of these provisions in 1936 is the most important single consideration facing the industry as a whole.

It would be pleasant—but not profitable—to dismiss this whole subject with the fatuous observation that the industry will continue to keep its house in order. That, of course, is what we hope; it is what we believe; but it is not what we can guarantee. Failing such assurance—and unfortunately this will always be lacking in voluntary agreements—the subject becomes a compelling one for discussion in this Annual Number—and for frank discussion at that.

First, it must be realized continually that code provisions on wages and hours, both per employee and per machine, have not been continued voluntarily out of sentiment. This was done out of the conviction that such action was in the best interests of manufacturers, individually and collectively. This was merely our old friend "enlightened self-interest" asserting itself.

It follows then that every effort should be made to establish as permanent policy the psychology behind these labor standards. Certain branches have started in this direction by securing formal pledges. This is fine, but still more is needed if the majority attitude is to be known and applied — because obviously there is no chance of enforcing an idea for any length of time unless it represents the will of the group concerned.

Consequently, it is our conviction that every association in the textile industry has as its No. 1 activity on the "must" list for 1936 the following three-fold job: (1) Constant check on degree of code conformance by its members; (2) equally constant study of and contact with the trend of thinking on this subject, within its industry—and preferably by groups; (3) readiness at all times to modify or adjust its program promptly to meet the ideas of the majority, and thus to substitute conscious planning for unconscious happening.

This three-fold job must be directed primarily at two specific phases of the problem: (1) Control of machine operations; (2) length of work-week for employees.

1. **Control of Machine Operations:** Two schools of thought, for and against, are still active. The antis are in the minority; most manufacturers, except those in the highly-styled lines, still seem unwilling to revert to uncontrolled production.

The pro group, however, has split into two factions on the question of single vs. double shift. Quite a number of manufacturers —in the cotton division particularly—are coming around to the idea of the alternative of a single shift of, say, 45, 48 or 50 hours, where desired, instead of two shifts of 40 hours each—but with, of course, proportionate increase in the weekly wage. (Those who even consider a longer week at the same weekly wage, thus reducing the hourly rate, are not thinking wisely.)

In support of this flexibility whereby either one or two shifts would be permitted, some argue, academically, that the two 40-hour week schedule places a premium on double-shift operation, whereas permission to work one longer shift would encourage single-shift operation, and tend to curtail production. Other proponents argue more individualistically from the basis that they are equipped for one-shift operation, and cannot compete with two-shift mills unless they have this latitude.

This is a subject which invites—in fact demands—research, and by groups, of course. What is good policy in print cloths may not be advisable in fancy rayon goods. What seems to be good policy today, may not prove to be so six months from now.

**2. Length of Work-Week:** As shown above, the question of number of shifts is closely related to length of shift. This must be discussed with utmost frankness. There is a group in this industry—and in this country as a whole—that does not believe the 40-hour week for employees is here to stay. This group argues that industry (the employers) is not sold on 40 hours; and that employees themselves are not sold, because in fact they prefer to work longer hours for more money. It is further contended that neither employers nor employees consider a 48-hour week socially undesirable. It is pointed out that organized labor is the only important group favoring the 40-hour week at this time; that it was adopted as an emergency measure; and that the sharp drop in hours was not in the permanent interest of industry or workers, as it could not be assimilated so suddenly.

Against this view is the contention that length of work-week is determined principally by economic considerations; that two-shift operation is here to stay in a large part of the textile industry; and that, given two shifts, a work-week longer than 40 hours would be disastrous, from a production standpoint. This argument leads right back to the single vs. double shift issue. The proponents of the former argue that the adoption of a single-shift—of 45 or 48 hours—as a **sole policy,** not as an alternative, would be the answer to all these problems—and would assure stability to the industry.

In this discussion, we have not been recommending or even suggesting specific courses of action to be adopted on these two principal problems. We have merely cited some of the doubts and conflicts that we know exist, so that they may be studied and evaluated. In fact we do not believe any association should recommend specific action until the most careful canvas has been made to determine what policies will receive active support.

Summarizing, the first job for the industry's collective management is to hold the fort on basic code provisions. The second, or rather a simultaneous, job is to keep in touch with industry thinking so as to be able to interpret that thinking in the form of constructive leadership.

THE EDITOR

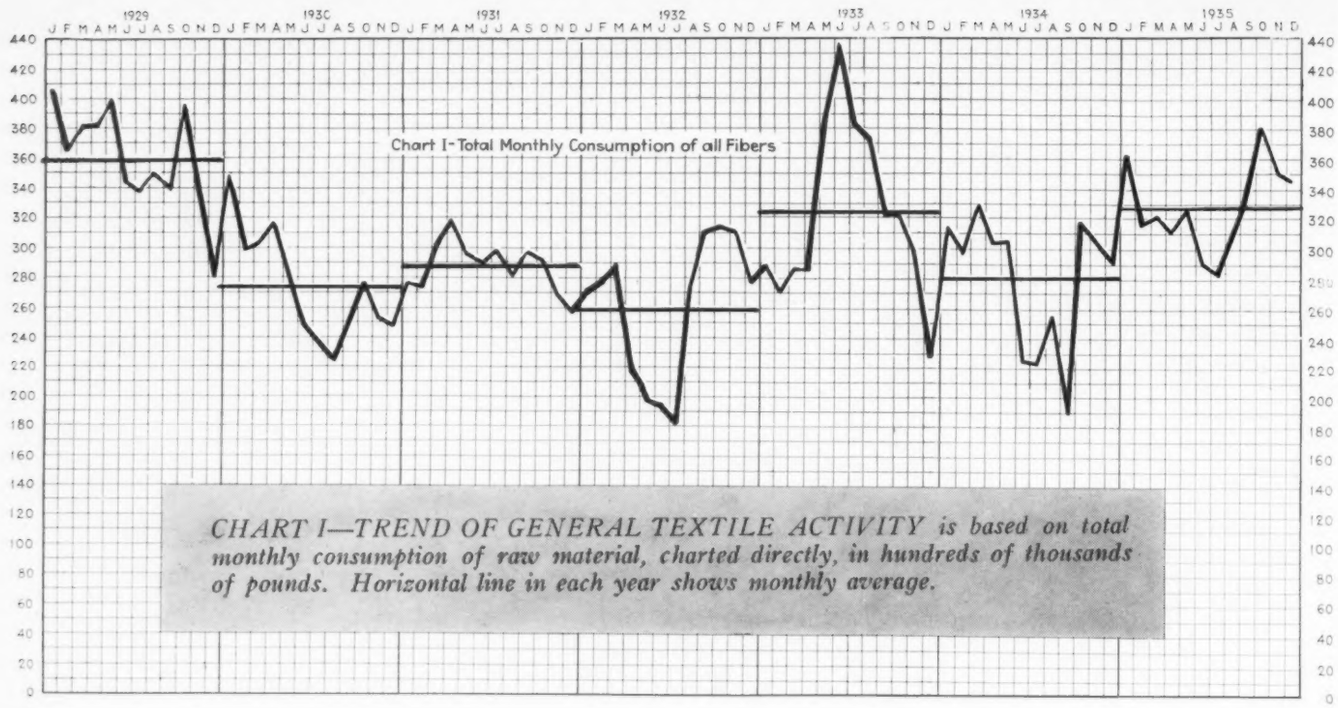



*CHART I—TREND OF GENERAL TEXTILE ACTIVITY is based on total monthly consumption of raw material, charted directly, in hundreds of thousands of pounds. Horizontal line in each year shows monthly average.*

# DEPRESSION-HIGH

## *1935 textile mill activity highest since 1929*

TEXTILE mill activity during 1935 was the highest since 1929. It just nosed out 1933—the NRA year—when speculative buying in anticipation of codes and processing taxes boosted production artificially. The 1935 demand was a much sounder one.

Activity last year was 17% higher than that of 1934. Since we predicted a year ago, in the Annual Number, that the 1935 rate would be at least 10% greater than 1934, and characterized that as a "conservative estimate," we feel that our reputation as a prophet is safe for another year at least. (Incidentally, the Department of Commerce estimates industrial production as a whole in 1935 at 14% over 1934.)

Compared with the 1923-25 average, 1935 textile activity was 5% up on this "normal." The record of the depression years, figured on this basis, follows:

*(1923-1925 Average = 100)*

| | |
|---|---|
| 1929 | 115 |
| 1930 | 89 |
| 1931 | 93 |
| 1932 | 83 |
| 1933 | 104 |
| 1934 | 90 |
| 1935 | 105 |

All the above estimates are based on the total consumption of textile raw material including wool on grease basis. This record is shown graphically in Chart I.

The news feature of the 1935 textile year was the amazing change which took place in August, inaugurating an extremely active fall which was in sharp contrast to the deplorable conditions of the earlier part of the year. Seldom has a change come more abruptly or more dramatically.

Looking ahead into 1936, there are two conflicting factors to consider: (1) the fact that this is supposed to be an off-year under the two-year textile cycle theory; and (2) the fact that general business is very distinctly on the up-and-up. We believe the effect of the latter will overbalance that of the former, with the result that 1936 will be at least as active a year as 1935. We know that this is contrary to the view held by some statisticians and economists who anticipate a lower rate of textile mill activity this year—but we still think ours is a conservative estimate, and shouldn't be surprised if there were even an increase in 1936. Naturally, this is for the industry as a whole, and does not necessarily apply to any one branch specifically. For example, we think it unlikely that the 1936 volume in the wool division will be up to 1935.

The most encouraging phase of the textile expansion last fall, and of the present outlook for at least the first half of 1936, was and is the part played by the capital goods industries. As we have pointed out previously in these columns, earlier attempts on the part of the textile industry to snap out of the depression proved abortive, because about all the support it got was from other consumer goods industries. The heavy industries were practically dead. Now, however, the picture in the latter groups has entirely changed, and consequently for the

first time since 1929, the up-trend is of the type that can be expected to continue.

The sour note in textiles has been—as it is so often—the profit angle. We stated above that 1935 was somewhat above 1933 in volume. Unfortunately it wasn't in profits. The inventory appreciation which occurred in 1933 was lacking in 1935. During the first half of last year, cotton manufacturers on the average lost money. The improvement at the end brought profitable business, but in many cases the damage had been done and the net for the year was not healthy. Wool manufacturers, on the other hand, had a profitable year, generally speaking. The trend in other branches of the industry was mixed, depending largely upon the individual firm.

Fortunately, there were signs of greater sanity on the question of price policy in the closing months of the year, and consequently the outlook for 1936 is more encouraging.

### *Progress By Branches*

There was wide disparity last year among the several branches of the industry, as represented by fibers. These are best reflected in Chart II, which shows consumption trends in cotton, wool, and silk in recent years. It will be noted that whereas cotton and silk tended slightly upward last year, wool shot up with amazing virility. Price trends in 1935 in these fibers (Chart III) were not significant. Unfortunately, rayon cannot be accommodated on these charts, because of its spectacular rise during the period covered.

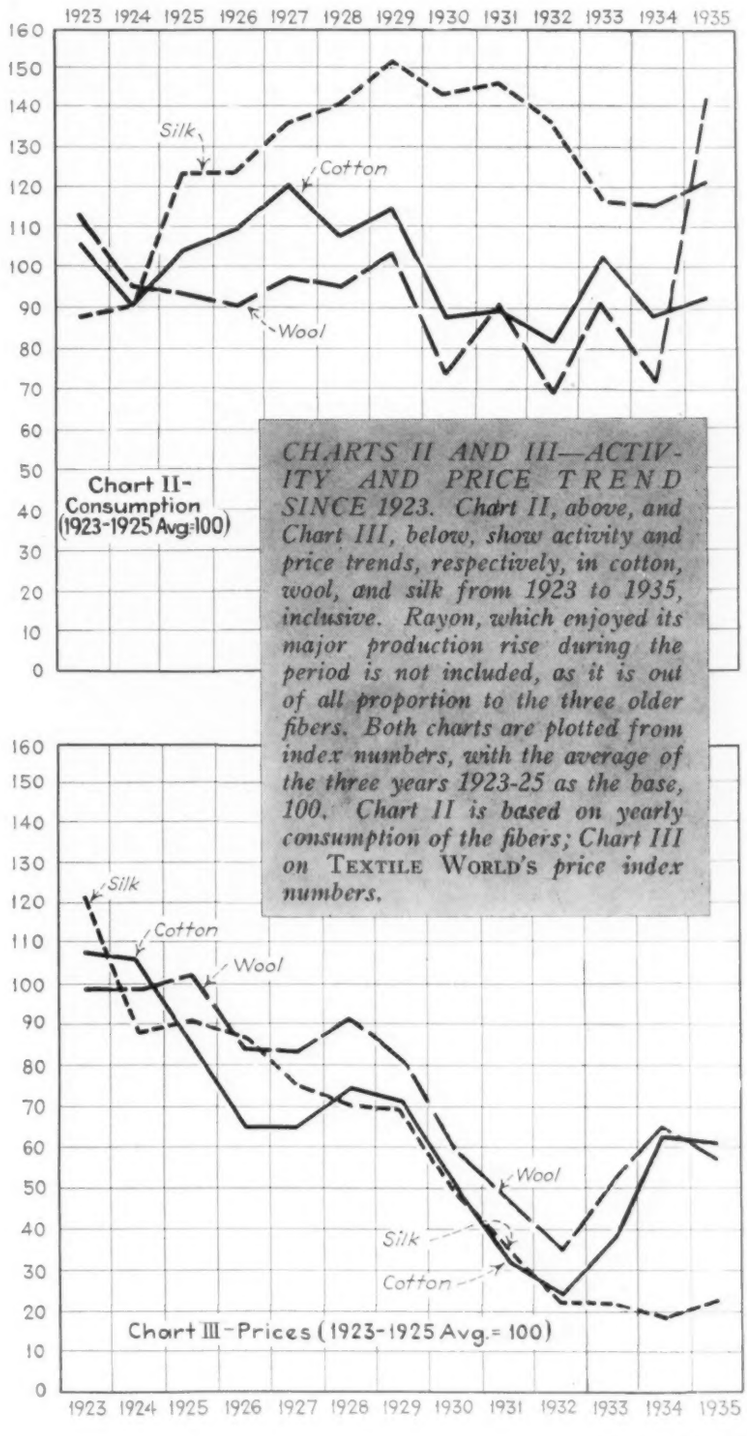
High-lights in the major fiber-branches follow:

**Cotton:** Consumption of cotton in the United States in 1935 was approximately 4% greater than in 1934—and 8% less than the 1923-1925 average. If the world should continue to use American cotton at the rate of the five months of the cotton season ending with December, the carryover of American at the end of this season would be about 1,300,000 to 1,400,000 less than that at the end of last season.

**Wool:** This furnished the fireworks in 1935—its domestic consumption being nearly double that of 1934—and 41% greater than the 1923-25 average.

**Rayon:** Rayon consumption in 1935 was 29% above that for 1934 and more than five times the 1923-25 average. Table I shows our Manchester (Eng.) correspondent's revised figures on world production of synthetic yarn and staple fiber.

**Silk:** This fiber registered last year its first price advance in some years. Its consumption was up slightly: 7½% above 1934 and 21% over the 1923-25 average.

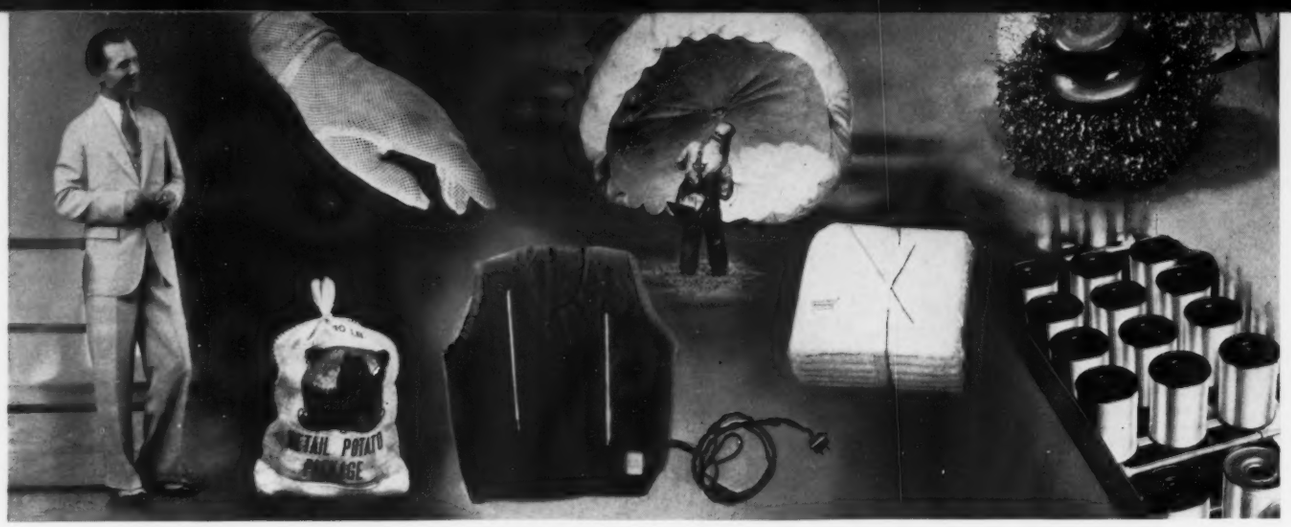



*CHARTS II AND III—ACTIVITY AND PRICE TREND SINCE 1923. Chart II, above, and Chart III, below, show activity and price trends, respectively, in cotton, wool, and silk from 1923 to 1935, inclusive. Rayon, which enjoyed its major production rise during the period is not included, as it is out of all proportion to the three older fibers. Both charts are plotted from index numbers, with the average of the three years 1923-25 as the base, 100. Chart II is based on yearly consumption of the fibers; Chart III on* TEXTILE WORLD'S *price index numbers.*

### *TABLE I—Estimated World Rayon Production for Year 1935*

(Figures in thousands of pounds)

| Country | Filament Yarn 1935 | Filament Yarn 1934 | Staple Fiber 1935 | Staple Fiber 1934 |
|---|---|---|---|---|
| Belgium | 11,500 | 10,750 | ..... | ..... |
| Britain | 111,800 | 90,875 | 7,105 | 2,890 |
| Canada | 12,750 | 9,750 | ..... | ..... |
| Czechoslovakia | 6,000 | 5,650 | ..... | ..... |
| France | 72,500 | 62,500 | 4,400 | 1,500 |
| Germany | 97,000 | 81,600 | 30,000 | 20,000 |
| Holland | 23,000 | 24,750 | ..... | ..... |
| Italy | 120,000 | 95,000 | 64,000 | 20,000 |
| Japan | 213,000 | 150,000 | 6,500 | 2,200 |
| Poland | 11,310 | 9,650 | 680 | 665 |
| Russia | 12,000 | 9,000 | ..... | ..... |
| Spain | 5,000 | 4,950 | ..... | ..... |
| Switzerland | 8,000 | 10,450 | ..... | ..... |
| United States | 257,000 | 210,300 | 4,000 | 2,200 |
| Others | 11,595 | 8,985 | ..... | ..... |
| Total | 972,455 | 784,210 | 116,685 | 49,455 |




*Left to right: Summer suit of acetate yarn; Cotton bags for packaging potatoes; String gloves; Electrically heated textile; American silk parachute; Rayon face cloths; Pot scourer made by a textile manufacturer; Part of the 250,000,000 lb. of rayon produced in 1935.*

# TUNING-UP MANAGEMENT

## *To meet competitive conditions of new era in textile manufacturing and processing*

*LASTEX, Velv-O-Flex, Solka, Aqua-Sec, Neva-Wet, Revolite; Doe-Tex, Dri-Tex, Surgitex; Sanitizing, Sanforizing, Rayonizing; Anti-Creasing, Fiber-Bonding, Trubenizing; Coolaine, Cordura, Korospun; Caro Cloth, Casuella Cloth, Pamilla Cloth.*

This much-abbreviated list of trade names of textile raw materials, products, and processes—unknown a few years ago, but now rapidly becoming a part of our everyday speech—is indicative of the changes which are taking place in the textile industry.

*Rayon production exceeding 250,000,000 lb. a year. One machine with the fabric-producing capacity of 300 looms. Rayon spinners making knit goods. Textile mills manufacturing clothing. Synthetics which simulate wool. Ringless hosiery. Fibrous-glass textiles. Rubber bathing suits. Cotton roads. Slit-cellulose film.*

These are a few more of the recent developments which cannot be ignored by the textile executive who has any hope or intention of tuning-up his organization to meet the competitive conditions of today.

Invention of one device—Hargreaves' spinning jenny—precipitated the mechanical and industrial revolutions of the 18th century. What then is presaged by these many innovations of the 20th century? Is a chemical revolution imminent? Or will the advance be by a more gradual process of evolution? It is too early to give complete and categorical answers to these questions. But it is not too soon to see that the textile industry has entered a new era. And it is high time for the textile manufacturer to take his bearings, so that he can determine his present position and intelligently chart his course for the future.

This discussion will be confined mainly to changes in textile technique and their effect on manufacturing and merchandising policies. It is important, however, that the problems engendered by these technical developments be considered with and correlated to other broad aspects of management which are reviewed elsewhere in this issue. The innovations to be covered here can be classified as follows: (1) new raw materials for textiles, (2) new textiles, (3) new products competing with textiles, (4) new markets for textiles, (5) new finishes for textiles, (6) new activities of textile manufacturers.

**Raw Materials**—Consider first the new raw materials for textiles. Go back 25 years. Think of rayon as the forerunner of the other more recent developments. Most textile men are well aware of the changes which have occurred and are still occurring as a result of the increasing use of synthetic fibers. The silk-weaving industry of a few years ago no longer exists as such, but is now largely a rayon-weaving industry. A third of the total production of women's circular-knit hosiery is now made from rayon. Cotton mills are consuming upwards of 90 million pounds of rayon annually. And rayon is constantly making bids in new fields, as witness the present attempts to develop a satisfactory automobile tire cord from that fiber. In addition to filament yarn, rayon producers are now offering two other raw materials to the textile manufacturer—staple rayon and slit-cellulose-film. From Italy come rumors of a wool-like synthetic yarn made from casein.

The rubber industry is offering a new textile raw material in the form of Lastex. Introduced about four years ago this type of yarn already has found many applications in the fabrication of knit and woven textiles. Recently a paper manufacturer has made available Solka, a purified cellulose made from wood pulp. This material, spun into yarn, is being used in making curtains, upholstery fabrics, rugs, dress goods, and overcoatings. Fine metal wire has been suggested as a textile raw material, principally in the fabrication of so-called heated textiles, but also to lend strength to yarns and fabrics. Still another new raw material is fibrous glass, a material which can be spun and woven or knit to produce fireproof and chemical-resistant fabrics.

**New Textiles**—Turning to textiles themselves, one must distinguish between strictly new products which are not made on conventional types of equipment, and new constructions of fabrics made on regular or modified textile machines. A few examples of the first group

*Left to right: Spun-silk and wool blanket; Artificial suede traveling-case; Wool necktie; Waterproofed silk football pants; Laying a cotton road; Cotton bale with cotton wrapping; Mercerized cotton sport shoe; Transparent silk beach costume.*

are pile fabrics produced on special equipment and with each pile fiber held vertically in a rubber base; blankets made by incorporating wool fibers with a cotton backing on a needle loom; and a fabric produced by a machine said to combine the principles of textile, paper, and rubber manufacturing.

Some of the new textiles made by the ordinary methods are notable chiefly because of the novel fiber combinations employed to obtain certain desired effects or because of the unusual construction of the fabric. Casuella cloth, for instance, is a cotton-rayon-mohair specialty fabric. Coolaine is an extremely sheer wool fabric. Korospun is an all-rayon knit fabric printed and finished to give the appearance of a fine worsted.

Others of the new textiles, in a sense, are not exactly new, but are adaptations of well-known constructions to new uses. A good example of this trend is adaptation of felt—for a long time important mainly for industrial and utilitarian uses—to the needs of the apparel manufacturer. Osnaburgs, once used for flour bags, now go into coats and jackets. Light-weight wool goods are offered for men's shirts and women's evening dresses. New cotton fabrics for men's slacks and summer suitings appear. Knitters broaden their range of products by introducing sport shirts and gym shorts. Weavers turn to making bathing-suit fabrics. Efforts to perfect cotton parachute fabrics continue. Scores of similar examples could be cited.

**Non-Textiles**—For some uses textiles are being replaced in part by non-textiles. Typical are the rubber bathing suit, the steel top for automobiles, and the light-weight metal airplane wing. Paper napkins, towels, etc., are steadily being improved; even window shades are made of paper. Many food products and other commodities formerly sold in cotton bags now come in cardboard boxes. Cellophane has taken the place of ribbons for decorative purposes. Women are wearing collarettes of metal chain instead of lace. The bare-leg fad and the topless bathing suit give evidence that merely a coat of tan is sometimes a substitute for textiles.

Counteracting the replacement of textiles by non-textiles is the development of new markets for textiles. Thus, cotton fabrics are coming into use in the construction of roads; rayon fabrics have been substituted for glass in the windows of greenhouses; acoustical fabrics have been introduced for sound-proofing radio broadcasting studios; campers and the many new devotees of winter sports have accelerated the demand for tent cloth and warm outerwear fabrics.

**New Finishes**—In the 150 years of its existence the textile industry has witnessed many remarkable improvements. But, with the possible exception of mercerization, no process of the 18th or the 19th centuries made any fundamental change in the structure or properties of textile fibers. Today, latex, synthetic resins, nitrocellulose, cellulose acetate, a host of other chemicals, are actually being employed to produce new and permanent effects undreamed of a few years ago. Among the chemical finishing processes for textiles which are now in commercial use are mothproofing treatments for wool, anti-creasing treatments for cotton and rayon, and waterproofing and water-repelling treatments for various textiles. Other processes are being employed for increasing tensile strength and resistance to abrasion. Still others are used in preshrinking knit goods, in lustering American-Oriental rugs, and in immunizing cotton yarns.

New mechanical processes give controlled preshrinkage of cotton piece goods, while combined mechanical and chemical treatments impart a wool-like handle and appearance to rayon. These are but a few of the many developments in finishing. Also should be noted a number of processes, such as the acetylation of cotton and viscose, which have progressed beyond the test-tube stage and which are expected soon to be of commercial importance.

One further development to be noted is the tendency —not yet general by any means—for textile mills to extend their activities beyond the manufacture of yarns and fabrics. In the past, production of consumer goods by textile mills was confined largely to sheets, pillow cases, blankets, and knitwear. At present a number of manufacturers of woven fabrics are turning out products for consumer use. Such products include among others towels, bath mats, and men's summer suits.

Enough has been said to show that the textile industry is not static; that numerous changes are taking place; that progress is not in a straight line, but in many directions. What then do these developments mean, and what can the individual manufacturer do to take advantage of them?

**Battle of the Fibers**—There has been considerable talk about the "Battle of the Fibers." With the entrance of the new raw materials mentioned earlier, the battle has turned into more or less a free-for-all fight. There is no indication, however, that any one fiber will emerge as the sole survivor of this battle royal. Cotton will remain the chief textile raw material for many years to come. Rayon production can reasonably be expected to keep up its present rate of increase for the next decade at least; and, as the synthetics are still further improved,

*Left to right: Woven bathing suit given elasticity by rubber yarn; Fibrous glass bats and yarn; Violin bow strung with cuprammonium yarn; Dirigibles require special cotton fabrics; Man-made fur from angora yarn; Cellulose-acetate umbrella fabric.*

they will encroach still deeper upon the silk and cotton fields and will begin to enter the markets now dominated by wool.

There will be also a gradual infiltration of fibrous glass, latex, and other new raw materials, some still in the experimental state. These will supplement cotton, wool, rayon, and silk; and, for certain specific purposes, will supplant them entirely. At the same time, just as rayon has permitted cultivation of some entirely new fields where the natural fibers were not suitable, so too will these other new raw materials open up frontiers which have not yet been explored. Obviously, those textile organizations which are the first to recognize the possibilities of the new raw materials and to pioneer in their use are the companies which are going to be in on the ground floor where the biggest profits are made.

The inroads which non-textiles are making in textile markets is due to the fact that such products are cheaper than textiles or because they are better suited to specific purposes. Only occasionally is it possible for the textile manufacturer to improve his product or reduce its cost to meet this type of competition. His chief opportunity, therefore, is in the development of new markets for the types of textiles he is manufacturing or in the development of new types of products for which a market exists or can be created. For many purposes, textiles are decidedly superior to any non-textiles which are now available, and at present the latter do not offer any serious threat to the industry as a whole. Competition of non-textiles is a problem, however, which individual manufacturers must solve if they are to continue in business. This is true also of the competition which textile manufacturers and processors are beginning to face because of the entrance of non-textile companies into the textile field.

**Battle of the Machines**—Of greater moment is the competition between various types of textiles. The "Battle of the Fibers" is little more than a skirmish when compared with the "Battle of the Machines."

The knitting machine and the loom wage a constant warfare. First the knitting machine gains ground in one direction, and then the loom makes an attempt to recapture what it has lost or to invade some other part of the knitting machine's territory. Thus far neither side seems to have made any large or permanent gains, but the battle goes on. Whether the individual knitting mill or weaving mill is to be a casualty or a survivor depends largely on how well it tunes itself to the times and, by good styling and aggressive merchandising, keeps up the volume of its sales.

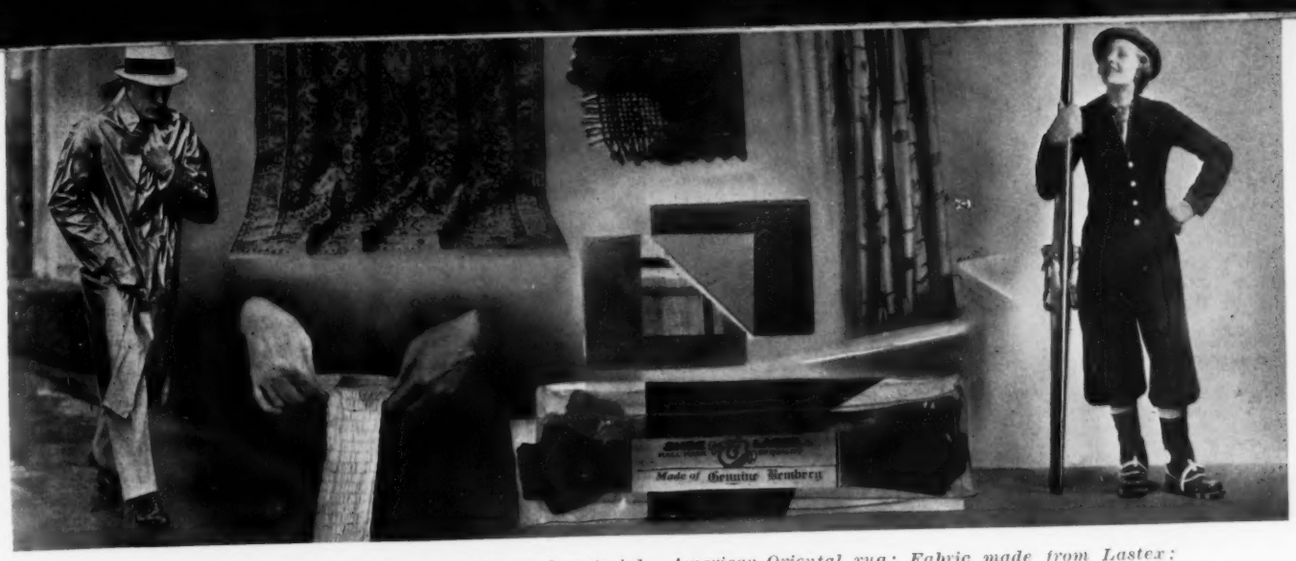
The battle between cotton machinery and silk machinery was precipitated by the increased production of rayon. At present 80% or more of fabrics woven by the "silk" manufacturers are composed in whole or in part of synthetic yarns. Cotton manufacturers, too, adopted the use of rayon, and over half of the synthetic yarn going into woven fabrics is consumed by the cotton mills. As the cotton weaver and the cotton finisher become more experienced in handling the "silk-type" of rayon fabrics, the "silk" mills will feel the competition more and more and, barring unforeseen developments, apparently will be forced to retrench and to concentrate on the smaller volume of all-silk, silk-rayon, and higher quality all-rayon fabrics.

For several years woolen and worsted spinning and weaving equipment has been losing ground in some fields to the corresponding cotton equipment. Despite an exceptionally good year in 1935, the more progressive members of the industry realize this. As a result, they are adapting wool goods to meet present-day demands; they are exploiting the desirable characteristics of wool and are endeavoring to eliminate the undesirable properties; they have set up an active organization for the industry-wide promotion of wool goods. With the constant improvement in cotton and synthetics, manufacturers of wool goods are facing a problem which is continuously growing more serious.

New machines operating on new principles and producing new types of textiles have entered the fray. These are comparatively recent developments, are few in number, and as yet have not become serious competitors to the conventional types of equipment. But it is more than probable that in the next few years these and other strictly new types of equipment will be further improved and will be installed in greater numbers. To say the least, it is an eventuality which textile manufacturers must be prepared to face.

It is too early to see whether or not there is a definite trend toward the production of consumer goods by manufacturers of woven fabrics. The experience of the knitters shows that there are no insurmountable difficulties in this, even for relatively small companies. Some weavers have attempted to get into the consumer market, only to give it up; others are now entering that field. The whole subject of vertical integration—of which the feasibility of individual manufacturers entering the consumer field is a part—is beyond the scope of this article, but demands serious consideration.

**Most Important**—Most consequential in their effects are the many new textiles and new finishes which have




*Left to right: Raincoat of new waterproof material; American-Oriental rug; Fabric made from Lastex; Blanket produced on a needle loom; Duplex fabrics combined with latex; Shoelaces of cuprammonium yarn; Rayon showerbath curtain; Wool gabardine ski-suit.*

been or now are being developed. Some of these new products have had no counterpart in the past. Some of the new finishes cause the fabrics to which they are applied to lose their fiber identity or render the fiber constituent unimportant. Often the new product is decidedly less expensive to manufacture or is far superior in its properties to its prototype. Frequently the new finish imparts so desirable a characteristic to a particular type of fabric that unless the fabric has that finish it can no longer be sold.

Development of new products and new finishes has given rise to some problems which are more or less common to all branches of the industry, and to others of concern chiefly to the processing divisions. Since some of the problems are technical, a research department is the first requirement. It may consist of one man; or it may comprise a well-equipped laboratory and a staff of technicians. At the very least, there must be some individual whose job it is to keep the officials of the company posted on all technical developments, within and without the textile industry, which may affect the business of the mill. Furthermore, development and patenting of a new product or process of value call for the formulation of a company policy in regard to licensing, branding, and quality control.

**Merchandising**—Merchandising of new products presents an intricate problem. If the product is for direct consumer use, the market is pretty well defined and the methods of advertising and selling are more or less standardized. If it is a fabric which does not go directly to the consumer, greater difficulty may be experienced in creating a consumer demand. Again, if a new product is developed to meet some particular need, the market for it is ready made. If, on the other hand, a product is developed without some specific use for it in mind, market research is necessary to determine its possible applications and potential sales.

Merchandising of a new finish presents much the same problem if it is brought out by a mill finisher or a corporation finisher. If it is developed by a job finisher, the merchandising is considerably more difficult. The number of really good merchandising jobs which have been done thus far on new finishes can be counted on the fingers of one hand—and these have not been done by the finishers themselves. However, the results obtained by such companies as Cluett Peabody, Sidney Blumenthal, and Neva-Wet with preshrunk, moth-proof, and water-repellent finishes show that merchandising of a new finish is not inherently different from the selling of any other new product.

Job finishers—when in rare cases they have done any real promotional work at all—have confined their efforts pretty much to the converters. Lately a few finishers have made an attempt to reach the ears and eyes of the garment manufacturers and the retailers. In some instances, the finish and the finisher are identified by selvage markings or by tags which are supplied to garment manufacturers to be attached to the dresses or other garments.

It is problematical how far a job finisher can go toward popularizing his name with the consumer, and still remain a job finisher. However, by close cooperation between individual finishers and converters, merchandising methods and policies can be worked out whereby each will receive recognition for his part in producing a new finish. This is well illustrated by the history of the Everfast fabrics marketed by N. Erlanger, Blumgart & Co., Inc., and processed by Joseph Bancroft & Sons.

A new product of worth deserves a worthy name. Any finisher knows that it is almost impossible to get a half cent a yard extra for giving any additional treatment to a cotton fabric. But a treated cotton fabric sold under a good trade name commands a price which permits a reasonable profit. At present considerable effort is being expended to insure truth in labeling. Rayon dress goods must not be labeled "silk"; blankets which are 80% cotton must not be labeled "all-wool." There can be no quarrel with this movement, but it should be emphasized that as fabrics lose their fiber identity or as new finishes are developed which cause the fiber constituent of a fabric to become unimportant, the necessity for fiber identification also vanishes.

**A New Era**—The history of this country is that general business depressions have ended with the development of new industries. Along with the last great general depression, the textile industry has been suffering from a private decline of its own. Even when production has been normal, reasonable profits have been lacking. It is not too much to hope or believe that the new raw materials, new products, and new finishes now available mark the end of the textile depression. The industry as a whole has entered a new era. To the individual manufacturer two courses are open. He can decide to keep up with the procession, or he can elect to trail along at the rear—finally to fall by the wayside. If he chooses to stay in the parade, he must tune up both his manufacturing and merchandising departments to the tempo of the times. He must be able to make and to sell those types of products which meet the new consumer demand.

# TEXTILE OUTLETS

## *In industry are in tune for larger consumption, say business paper editors*

## RUBBER PRODUCTS

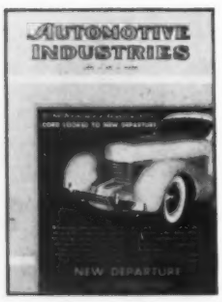
***By D. C. McRoberts***
*Editor, India Rubber World*

THE YEAR BY YEAR consumption of fabrics in the rubber industry bears a fairly constant relation to that of crude rubber. The consumption of rubber in the United States has consistently increased since 1932 until that for 1935 is estimated to be about 500,000 long tons, or some 30,000 tons in excess of the banner year 1929. Most forecasters expect a 10% continuation of this increasing trend during 1936. Cotton absorption in the rubber industry during 1936, therefore, should advance in about the same proportion.

## FOOD PACKAGING

***By L. V. Burton***
*Editor, Food Industries*

TREND IN THE USE of textiles for bagging in the food industries is slowly away from textiles toward paper, particularly toward the large multi-wall paper bags for industrial use. This bag is slowly gaining acceptance for the packaging of flour, sugar, cocoa, salt and other powdered food products. While the acceptance of the paper bag in the food business has not reached marked proportions, the trend is unmistakably in that direction.




## AUTOMOBILE FIELD

***By Herbert Hosking***
*Editor, Automotive Industries*

DURING THE YEAR 1934, more than 29,500,000 yd. of upholstery fabrics were used in the construction of passenger automobiles. As there is a direct indicated correlation between car production and fabric use, the figure for fabric consumption in 1935 should approximate 38,000,000 yd., and 1936 should raise the figure to approximately 43,500,000 yd. Consumption of cotton fabrics will pass the 200,000,000 lb. mark for 1935. Experiments with rayon for use in breaker strips of tire-casings may reduce the indicated rise for 1936, but increased gasoline consumption for this year means that tires are being worn-out faster and the consumption of cotton fabrics may rise directly with tire production. With universal use of the all-steel automobile top in 1936, the relatively small market for fabric top coverings will have disappeared entirely.

## MACHINERY FIELD

***By K. H. Condit***
*Editor, American Machinist*

INDICATIONS POINT to a general improvement in activity for the metal-working industry which may develop into a period of prosperity unparalleled in our experience. Naturally that would bring a corresponding increase in the consumption of textiles in the manufacturing plants and contract shops of the industry. Specifically it would mean greater call for cloth wipes and wastes, which are the chief textiles used and a larger consumption of such things as bakelite gears and felts for oil seals.

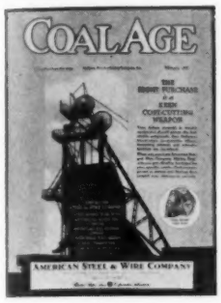
## LUGGAGE

***By Doris Burrell***
*Fashion Editor, Luggage and Leather Goods*

IT MAY BE COMPUTED that approximately 9,750,000 yd. of fabrics were used for lining in the output of the handbag industry for 1935. The material used varies in cost from 27c. to 90c. a yard. It may also be conservatively estimated that 1,000,000 yd. of fabric go into the making of novelty bags. This use takes in many types of materials, from tapestry cloth to satins used for evening purses. Considerable linen and cotton is used in sports bags for summer, and coat fabrics are quite widely used in daytime bags during fall and winter seasons.

The outlook for 1936 is not for increased yardage in

the bag industry since the present lift in business will tend to increase the average unit cost of handbags but not the number of handbags.




## COAL MINING

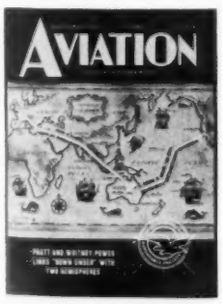
*By Sidney A. Hale*
*Editor, Coal Age*

WITH IMPROVING general business, demand for coal should show further expansion in 1936. Such expansion will mean a heavier demand for equipment and supplies used in coal mining. This should be reflected in increased use of belting, brattice cloth, hose and ventilation tubing. While the greater stress on packaging coal for delivery to the household consumer theoretically should open a wider market for textiles, actually this market has been largely preempted by the paper-bag manufacturer. The coal-mining industry is a major employer with approximately 65% of the cost of production absorbed in direct labor charges.

## CONSTRUCTION FIELD

*By F. E. Schmitt*
*Editor,*
*Engineering News-Record*

PRESENT SIGNS justify the conclusion that 1936 will see decided progress in the business of contractors and tributary and service industries; this, together with the fact that the construction field as a whole is recovering from the 1929-1933 collapse, should mean proportionate improvement in our limited consumption of textile materials. House construction has shown a sharp rise, which if maintained will mean more widespread use of roofing felts, etc. Use of cotton in road construction remains in the experimental stage.




## AVIATION

*By Leslie Neville*
*Managing Editor, Aviation*

AT PRESENT, the largest use of fabric-covered airplanes is found in pleasure, instructional and industrial flying and miscellaneous fixed base operation. Although figures for these activities are not yet available, the number of student permits issued is a fairly accurate index of current instruction activities and of future miscellaneous flying activities. At the peak season this figure was nearly double that of last year. Following the experiments of the road builders, airport engineers are about to try cotton reinforcement for field runways. A runway of this type will be installed experimentally at Newark Airport under the proposed W.P.A. improvement program and another will be tried by the Army Air Corps at Riley Field, Anniston, Ala. Recent developments in interior decoration and soundproofing of airplanes should create increased call for certain fabrics.

## FOOTWEAR

*By Arthur D. Anderson*
*Editor, Boot and Shoe Recorder*

HOT FROM THE BIGGEST national shoe fair now in session in Chicago, I send you the news that surface fabric in footwear was emphatically placed in the spring fashion picture by the jury on style. Last year's production of 6,000,000 pairs of fashion fabric footwear will in all probability be exceeded. Textile consumption in boot and shoe industry has always been large in linings, backings and covers so statistical footage is difficult to compute for practically every shoe of 388,000,000 pairs has textile service from thread to even soles themselves. One fly in the ointment is: The increase of cement bottoming has decreased materially sole stitching heavy thread. When surface fabric makers created specially woven shoe fabrics instead of trying to by-product suiting cloth they made a market for shoes and handbags as companion articles of sale in nearly every smart shoe store in America. This, too, is a hot tip, for shoe style is translated into bag design.

## CHEMICAL INDUSTRIES

*By S. D. Kirkpatrick*
*Editor, Chemical & Metallurgical Engineering*

CHEMICAL AND PROCESS industries are likely to be of increasing interest to textile manufacturers in 1936 for at least two very plausible reasons. First, because of the diversity of their operations and the basic character of their products, chemicals enter into the manufacturing processes of almost every other industry—including textiles. Hence any further upward swing in business as a whole will be quickly reflected in larger production schedules. The second important reason for optimism is that chemical industry is in a period of very rapid growth. A continuous stream of new products and processes has been pouring from the research laboratories during the depression and an increasing number of these is now being translated into successful production. Chemical and textile industries are so closely interrelated both as producers and consumers as to make unnecessary any further interpretation of these trends.

# TUNING-UP LABOR RELATIONS

## *Will improve the earnings record*

LABOR disturbances are never figured as an item of cost, but when they occur they cause out-of-pocket expense for both mill and workers. Sound employer-employee relations mean increased profits for both parties quite beside the social aspects. Clinical analyses of typical labor disturbances in New England and the South during 1935 are helpful, therefore, in serving as a basis for predicting the course of events in 1936 and in pointing out the danger spots.

In New England, with some exceptions, not much trouble has had as its cause the refusal of management to deal with union officials. The union, however, was not successful in its big strikes in 1935 and actually lost ground because of them. For this reason, the outlook for New England is for not many big strikes, but for quite a number of small ones, where the workers are pulled out for a few days for this or that reason. The problem is to keep these affairs small.

In the South, the demands of the U.T.W. to be recognized under the Wagner-Connery Act will continue to be the chief cause of irritation. The situation is one that causes peevishness on both sides and must be carefully handled. In both sections, the most encouraging tendency is for workers and management to give up the "fussing about" and get down to a plain, human relationship.

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### IN NEW ENGLAND—

FROM the standpoint of the woolen and worsted industry, the most important development of 1935 was the failure of the U.T.W. to win the strike at the six plants of the Uxbridge Worsted Co. in Massachusetts and Rhode Island. If the union had achieved its ends here, it undoubtedly would have considered that it could go on to bigger and better things.

In June, the U.T.W. began to feel its oats, and there was big talk to the effect that a higher, standardized scale of wages and standard work assignments was to be imposed on the industry. Although the union claimed that the Uxbridge strike, which was called June 24, was a private affair, the apparent strategy was to get the desired scale of wages established in these plants, and then put the pressure on other mills. The union demanded higher wages, decreased work loads, and elimination of the third shift. The catch was that Uxbridge has been among the high-wage mills, that work assignments have been adjusted scientifically and fairly, and that it is pretty hard to get workers to fight for two-shift operation as against three when it means that one-third of their number lose their jobs.

Under the circumstances, it became obvious at an early date that the 3,000 workers wouldn't keep on being used as a U.T.W. experiment, no matter how much pressure the union put on. When the unrest of the workers became so widespread that the operatives in the Pascoag, R. I., plant of the company decided they would form a union of their own, the U.T.W. became worried and made what it chose to call a "compromise" settlement. The plants reopened on Aug. 6. The U.T.W. gained practically nothing and everyone else lost.

In the case of the Webster (Mass.) Mills of the American Woolen Co., the U.T.W. came very close to "winning" the indefinite closing of the plant, but otherwise the whole proceeding was futile and deplorable. Trouble started on Aug. 14 when the carders struck for a wage increase. The U.T.W. next moved for a general increase throughout the plant of 10 to 20%. At no time does the union appear to have had control over much more than one-third of the 1,000 workers, but this number was sufficient to cause so much trouble that the management closed the plant and stated that it would not reopen until 80% of the workers showed their willingness to return under the same conditions that existed prior to the strike. As townspeople took a hand and as the non-union workers started to organize on their own, the grip of the U.T.W. weakened and operations were resumed in mid-October.

Although most of the action took place in 1934 the U.T.W. officially "won" the strike at Hamilton Woolen Co., Southbridge, Mass., on Jan. 15, 1935, when stockholders voted liquidation as a result of a series of labor disturbances. The plant was purchased on Feb. 12 by J. P. Stevens & Co. interests.

The other affair that attracted the most attention in the woolen and worsted field was the injunction against the U.T.W. that was secured by the Cocheco Woolen Mfg. Co., East Rochester, N. H., which also operates the Gonic (N. H.) Mfg. Co. and the Ware (Mass.) Woolen Co. A strike was called at East Rochester when wage adjustments were made to conform to the rates prevailing at Gonic. An attempt was made to reopen on June 10, but the plant was closed again four days later. During the ensuing weeks, it was a battle between the union and the workers who wanted to return and who formed a protective association. On July 3, the management took a hand and secured a sweeping injunction restraining the U.T.W. from interfering with the company or the protective association. The plant opened on July 8 with adequate police protection and there was no trouble. The management has taken the position that the independent union in the plant represents the workers and has refused to deal with the U.T.W. An injunction was also secured at Gonic; employees there twice voted against striking and remained on their jobs.

The greatest disturbance in the cotton-goods industry of New England took place at the Pequot Mills, Salem, Mass., and the Danvers Bleachery, Peabody, Mass., both operated by the Naumkeag Steam Cotton Co. The case is depressing to students of employer-employee relations,

as Naumkeag has been noted for its fair treatment of workers, and illustrates the harm that can be done by a group of "crusaders" among the operatives. After the strike of 1933, an agreement was signed between management and the Independent Sheeting Workers Union. When the agreement ran out on July 17, the union modestly asked for a new agreement and a 25% increase in wages! The company replied that, on the contrary, it was well known that wages in the mill were higher than in competing mills, and that it would be necessary to make a downward adjustment ranging from nothing in the lower brackets to 15% in the higher. Other textile manufacturers agreed that Naumkeag was justified in the adjustment. At first, the union planned a one-day "demonstration" strike, but some leaders thought it was a good time to get up a whole set of "demands" The result was a strike lasting from Aug. 12 to Oct. 22, and affecting 2,100 workers. In the settlement, it was agreed that the wage question should be decided by Fred M. Knight, State industrial relations adjuster. After an investigation, Mr. Knight decided in favor of the mill.

Several instances will suffice to show that the closed shop is already a factor. At the Aspinook Co., Jewett City, Conn., 400 were thrown out of employment because operatives in the dye-house refused to work with a non-union man. The management moved the man to another department. At the Charlton Woolen Co., Charlton City, Mass., there was a strike for two days in October because two non-union workers were employed. This one was solved when operatives turned up for work with the statement that they had persuaded the two in question to join the union.

Cases where strikes were called because of the discharge of union members were not numerous or of great importance. Broadly speaking, the U.T.W. is in a strong enough position to cause plenty of trouble in New England, but it has its own troubles. The big worsted center of Lawrence is not organized and that makes the going hard for the union in that branch. No doubt the union also does some worrying over the fact that employees of the Pascoag plant of Uxbridge Worsted got up an independent union on their own hook; and also that the Protective Association won over the U.T.W. at an NLRB election at the Stevens Linen Works, Dudley, Mass., on Nov. 4. The Protective Association was later granted a wage increase.

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## AND IN THE SOUTH—

THE most widely discussed development in employer-employee relations in the South since the general strike of 1934 is the National Textile Labor Relations Board. This board, indefinitely extended by the President last summer as mediator in disputes between labor and management, has succeeded on every hand only in antagonizing the southern manufacturer. With rare exceptions, NLRB hearings have resembled criminal-court proceedings—without a jury—with counsel for the board in the rôle of prosecuting attorney!

Passage of the Wagner-Connery Act in July, 1935, was a signal for renewed efforts on the part of the United Textile Workers to secure recognition of the union by manufacturers. Locals all over the South raised a hue and a cry for elections, by secret ballot, to determine who should represent the employee in collective bargaining. Great rivalry developed in the villages between members of the U.T.W. and the Goodwill or Friendship associations, the latter an outgrowth of the general strike and composed of non-union employees. Usually, various and sundry petitions were passed among the workers by both organizations, each trying to get a majority of signatures. If the mill refused to recognize the U.T.W., charges of discrimination were filed with the Board, and a hearing was called. In every single instance, hearings resulted in a favorable decision for the union!

The Board would then order an election, which, in most cases, was bitterly opposed by the mill involved. For example, Gate City Cotton Mills, East Point, Ga., ordered to have an election, made an effort to secure an injunction against any election. At the same time, an employee, Mrs. Lola Echols, filed a suit with the District Supreme Court challenging the constitutionality of the Wagner-Connery Act, and declaring that she would be irreparably damaged if the U.T.W. were given power to represent her. "This woman has the right to live her own life and sell her own labor free of molestation," declared her attorney. Although both the mill's and Mrs. Echols' petitions were denied, the election was withheld for 20 days in order to give them an opportunity to appeal if they wished. Then attorneys for both parties came to an agreement whereby the election would be stayed until after the Wagner-Connery Act was tested for constitutionality. The Gate City Cotton Mills case is further advanced in the courts than any other cotton mill case, and may serve as a test case in the Supreme Court.

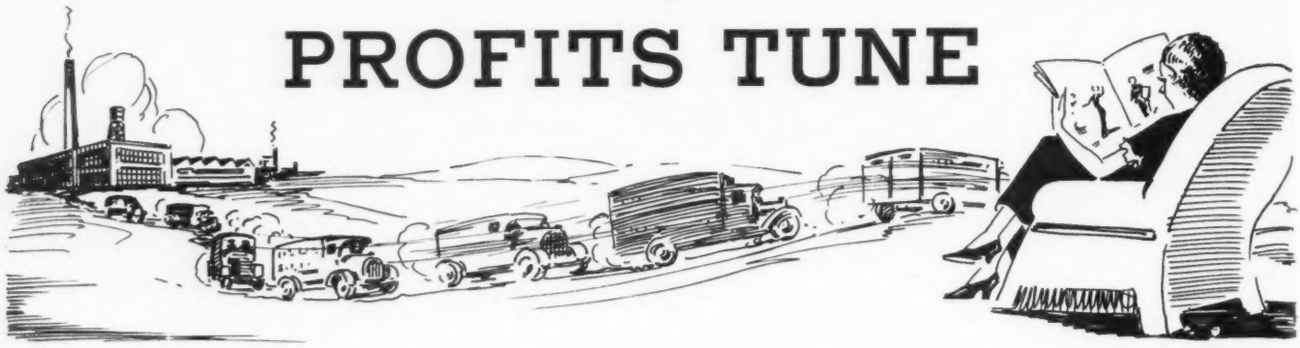
Two mills, Oakland Mill of Kendall Co., Newberry, S. C., and Monarch Mills, Lockhart, S. C., reserving all legal rights, consented to elections. No reason for this action on the part of the mills has been made public as yet. In both cases, the U.T.W. cast the majority votes, but not representing a majority of total employees.

Another extremely interesting case is that of Clinton (S. C.) Cotton Mills, charged with violating the Wagner-Connery Act and discharging 96 union employees who refused to join the Friendship Association. The mill contended that it had absolutely nothing to do with the organization or administration of the Friendship Association, and presented 650 affidavits, signed by employees in the presence of disinterested witnesses, to the effect that they had not been coerced into joining the association. Further, the mill asserted that it was within its rights in signing a contract to bargain collectively with the Friendship Association, since the association claimed the majority of members. The association of its own accord, said the mill's attorney, decided to have a closed shop, with the result that 96 U.T.W. members were turned away from work. In the face of the mill's contentions and documentary evidence, the board ordered it to "cease making membership in the Friendship Association mandatory," and failed to recognize the association as the employees' representative. Further, it ordered all discharged employees reinstated with back pay. Officials of the mill will take the case to higher courts.

With reference to the general labor situation in the South, it has been quiet since the 1934 strike, with the exception of sporadic flare-ups at scattered points.

*Promoting to the consumer is a major note in the 1936*

# PROFITS TUNE



THE struggle for survival which the depression brought to most textile companies has had a salutary effect on merchandising policy. That is very clear when we survey the 1936 outlook. Gone is the gay and careless sales mentality of the golden period preceding 1929 when business came in more or less unsolicited. Instead we have a totally new viewpoint, a broader, more alert merchandising sense which promises well both for gross and net income during the year now opening. One significant aspect of this new viewpoint is the increasing trend toward what for lack of a better term we will call "vertical promotion"; in other words, the practice of carrying the mill's sales message through weavers and knitters and the store to the consumer. "Vertical promotion," of course, is not new. The principle of selling beyond the immediate customer has been applied by one or two far-sighted firms in each branch. Today, however, an increasing number of firms are adopting the policy with satisfactory results.

This new promotional trend, while significant, is only part of our picture. To get the full view we must examine merchandising minutely in its four major divisions: (1) market analysis; (2) styling; (3) customer service; (4) promotion and publicity. Studying these divisions individually, we find a concerted effort to profit by the lessons of the depression and to develop policies more in key with the new period.

*Market Analysis:* Textile accomplishment in this direction since 1929 has been more promise than performance. It is true enough that, under pressure by a desperate slump in sales, all textile branches studied their markets vigilantly and that they did succeed in opening many new outlets; yet the fact remains that market analysis in the textile industry is still pretty much of a hit-or-miss proposition lacking in plan or precision. There is a trend, as in knitted outerwear, to link analysis of markets more closely to analysis of the machine's capacity to vary the character of its product, and this, while only part of the larger problem, is certainly constructive.

*Styling:* The most notable development in styling is that this activity is coming to assume the identity of a separate industry. Formation of the Fashion Group supplied textile stylists with a forum for intelligent exchange of fashion opinion which has helped to make textile styling more orderly and systematic. With respect to the different fibers, styling progress has been indeed impressive. Cotton has risen from a utilitarian to a luxurious and decorative textile, and this is true equally of the modest sheets and towels and of the apparel and miscellaneous fabrics. Woolens and worsteds have pushed forward into many new fields, as witness the worsted neckties, shirts, underwear, etc., and the growing popularity of sheerweight worsteds for summer.

Rayon, of course, shot up like a meteor during the depression, and, aided rather than injured by the conditions of those grim years, the synthetic yarn in 1935 found itself definitely established in fashion fabrics. The depression had an especially stimulating effect on the styling of knit goods. Hosiery, underwear, outerwear, all showed themselves fashion-conscious.

*Customer Service:* One of the few large cotton companies to remain on the black side of the ledger throughout the depression, credits its success to a "three-way road to profits" as follows: (1) Building consumer confidence and acceptance through effective promotion; (2) Giving individual attention to the sales problems of individual customers, this aid being maintained *all year* not just seasonally; and (3) Becoming "completely retail-minded." A limited number of textile firms, some making ready-to-retail merchandise, and others making textiles in the intermediate stages, have adopted this idea. The principle is that the sale is not consummated when merchandise reaches the "first" customer but that acceptance by the distributor and ultimate consumer is equally necessary to complete the transaction. Proponents of this idea claim that from now on the efficient manufacturer will find himself compelled to adopt this policy.

*Promotion and Publicity:* Increased promotion was an obvious road to volume in 1930-1933; yet numerous firms slashed their promotion budgets to the point where sales were adversely affected. The firms which curtailed only moderately in promotion had the best financial showing for these years. Today certainly the textile industry is more awake to the values of the various promotional methods—advertising, fashion shows, fabric development, education, etc.—than it was in 1929. When we consider the many activities planned for 1936 by individual firms and by the various trade associations it is clear that a year of promotion which should be most helpful in building profits is now opening.

It should be noted too that all textile branches, virtually without exception, have improved their selling term structure since 1929, thanks to the NRA. Outstanding are the recently promulgated Worth Street Rules of the cotton textile industry and the modernized raw silk rules; however, many other branches too have brought needed reforms in this important part of the picture.

Finally we may offer three thoughts as suggested guides toward profitable merchandising in 1936: (a) More careful study of the machine's capacity for varying the character of its products, with a view to widening the range of the company's line; (b) vertical promotion; and (c) rejection of the old idea that certain fibers and fabrics must be limited to their traditional markets.

# WASHINGTON GRAB-BAG

## *What will industry pick out of it in 1936?*

***From TEXTILE WORLD's Washington Office***

◆ *When we asked our Washington office to give us the dope on probable legislation affecting industry which will be passed at this session, we felt a little guilty. It was a tough assignment. The political maneuvers this year increase the hazards of such prophecy. However, we feel that our correspondent did a good job. He shook the field down to what seem to be strong probabilities. He, and we, offer this dope without guarantee.*

BEWARE OF SUBSTITUTES! Inflation for taxes. Greenbacks for sound money. Townsend plan for social security. Political control for industrial management.

Frustrated at so many points, Washington is boiling over with schemes that may be "just as good," this year at least, but the casting around for make-shift methods is scant assurance to business that the Government knows where it is going. Open avowal of desire for a constitutional amendment would at least give direction to a legislative program that is floundering around without its usual leadership. The present situation invites extremists to push their wares.

**Taxes**—To think that inflation is en route may be a silly apprehension, but, in its ultimate form, inflation never was the result of a deliberate policy.

Adequate taxation is the only sure preventive and the textile industry has no more ground for complaint than another, unless it is singled out to assume the burden merely for the reason that it paid the processing taxes for the benefit of farmers. As we are given to understand now that the AAA was designed for soil conservation, in which the nation as a whole benefits, the process-industries are divorced from sole responsibility.

In any event, new taxes must be spread over a wider base. Congress would be glad to banish the thought—if the money did not have to be raised. Certainly the retroactive feature of tentative excise tax proposals will go by the board or terminate abruptly when challenged in court. It certainly would be immoral and probably is unconstitutional, as a tax on past transactions made without contemplation of such a tax may mean the difference between profit and loss. A boost in corporation income taxes is a possible alternative to excise taxes that, being taxes for the most part on the poor, would tend to fan popular resentment among the class that the New Deal relies upon for support, whereas the angering of corporation stockholders would be very little loss politically.

**Social Security**—To anticipate that the Townsend plan has a chance in Congress is foolish, but it may result in further liberalization of the Social Security Act and impose an added burden on business. That is NOT idle talk unless Winant's board is given to chatter.

In subordinating social to economic objectives, without discriminating appraisal of probable effects, the risk to business is obvious. The character of legislation pending in Congress is evidence that the crusading spirit which carried business along with it has degenerated into mere nagging at the heels of industry.

**NRA Substitutes**—The Ellenbogen bill to set up a little NRA in the textile industry is an example of intrusion into an industry that, on its own motion, is striving to perpetuate the provisions of its NRA system. Many other bills that probably will be talked to death in committee rooms are merely attempts to pick up odds and ends of NRA, without coordination and without direction.

Labor is rampant and the pressure on Congress to throw something its way is terrific. It won't get the Black 30-hour or O'Mahoney corporation licensing bills, but the Walsh bill subjecting contractors to regulation of wages and hours on goods and services supplied to the Government is very likely to come through. Such regulation probably will be limited to the first contractor, and it's likely, too, that small contractors would be exempt. The bill would have a profound effect on industrial operation. There are two schools of thought on it at present. One favors a rigid formula fixing minimum wages, maximum hours. The other advocates flexibility established on regional averages that, in the textile industry for instance, takes care of North-South differentials.

**Trade Practices**—Extending jurisdiction of the Federal Trade Commission to include "deceptive" as well as "unfair" trade practices is running strong. Senator Wheeler is expected to take the initiative and Representative Rayburn, chairman of the House Interstate Commerce Committee, also is much interested. This bill represents an attempt to circumvent the Supreme Court's decision that threw out one of the commission's orders on the ground that there can't be unfair competition between two crooks. Such reasoning doesn't afford much protection for the consumer and the Trade Commission asserts that it is functioning *pro bono publico*.

Still young and tender is the Tydings bill that would suspend operation of the anti-trust laws where they come into conflict with operations under state "fair trade" laws, which are sweeping the country. From the Department of Justice comes practical assurance, however, of anti-trust action against trade associations for price maintenance and price fixing.

Resurrection of NRA in any guise finds only unbelievers. Those that would like to bring it to life think that possibly the President's strategy is to let George Berry and his council ride along and maintain the status quo until next year, by joint resolution continuing various units created under NIRA. This is wishful thinking of doubtful plausibility as the existing remnants are hardly worth saving.

| Principal Textile Imports into the United States | 1923 | 1926 | 1932 | 1933 | 1934 | 1935 (Est.) |
|---|---|---|---|---|---|---|
| Cotton cloth, sq.yd. | 218,970,000 | 60,680,000 | 28,221,000 | 40,129,000 | 40,552,000 | 64,095,000 |
| Cotton yarn, lbs. | 5,269,000 | 4,315,000 | 1,296,000 | 1,597,000 | 1,773,000 | 1,972,000 |
| Raw cotton, 500 lb. bales | 374,730 | 362,786 | 104,078 | 146,088 | 144,537 | 96,000 |
| Clothing & combing, wool gross, lbs. | 266,000,000 | 181,000,000 | 15,775,000 | 43,782,000 | 23,584,000 | 43,000,000 |
| ***Principal Textile Exports from the United States*** | | | | | | |
| Cotton cloth, sq.yds. | 464,520,000 | 513,300,000 | 375,446,000 | 302,042,000 | 228,641,000 | 190,000,000 |
| Carded & combed yarn, lbs. | 12,081,000 | 12,132,000 | 15,512,000 | 11,981,000 | 7,738,000 | 6,340,000 |

# JAPAN . . .

## *The whole cast in textile import performance of 1935*

JAPAN dominated the textile import situation in 1935 completely. With Chambers of Commerce whooping it up, with Cabinet Committee hearings, and with textile leaders making known their views in no uncertain terms, the industry certainly achieved its purpose in giving the public an understanding of the Japanese situation. The industry, however, was much less fortunate when it came to getting something done about it all.

The cold figures reveal that Japan shipped us 7,286,000 sq.yd. of cotton goods in 1934, and 36,474,000 sq.yd in 1935, which makes a nice little gain no matter how you look at it. The only encouraging feature is that imports dropped during the last six months of the year as compared with the first, the figures being 14,985,000 sq.yd. and 21,491,000 sq.yd. respectively. As has been pointed out many times, the total volume of imports is not as important as the fact that Japan has concentrated on certain lines and dominates the price situation in these categories. Further, the industry has reason to worry about what is going to happen next. In velveteens, for example, Japan did not send us a single yard in 1934, only 3,944 sq.yd. in January, 1935, but by October the total for the month had jumped amazingly to 470,841 sq.yd. It has been estimated that imports in this line have been running about 70% of domestic production for an average year.

So far, all that the industry has been able to secure in the line of protection is a "gentlemen's agreement" limiting Japanese shipments to the Philippine Islands, and an announcement by the State Department that Japanese manufacturers and exporters had agreed to limit shipments to this country on a voluntary basis. The first is regarded as giving Japan more than an equitable share of the Philippine market, and the second is regarded with skepticism. There does not seem to be much chance of the industry getting anything more at this time. Government officials take the position that nothing should be done until actual importations reach the point where it can be proven that the American industry is severely damaged. The industry doesn't like the idea of having to wait until it is knocked flat before receiving any help.

It was not only the cotton branch that heard the rumbling of Japanese competition. Worsteds from the Land of the Rising Sun made their appearance in the New York market last fall. Although no large volume was sold and the lines were more in competition with British fabrics, the market was nervous when it was revealed that prices were 30% below those for comparable domestic products. Similarly, whenever imports of cotton hosiery took a jump some month, knit goods manufacturers were up in arms to guard against further inroads. Altogether, the Japanese situation received a pretty thorough going-over in 1935. Japanese business men rather plaintively complained during the midst of the storm that their country was being subjected to "harmful progaganda."

Turning to the export situation, the most important events of 1935 were the agitation for an export bounty and the signing of a reciprocal trade agreement with Canada. Samuel Lamport, chairman of the tolerance committee of the Textile Exporters Association, was an early advocate of a plan whereby the Government would sell 500,000 bales of its cotton to the mills at market price, and then give the mills a rebate of 7c. per lb. when evidence was produced that the goods had been exported. The Cabinet Committee that investigated the textile industry turned the suggestion down with the explanation that other nations might be led to retaliate. A similar procedure would have been possible under Section 32 of the AAA amendments, which allowed certain sums to be set aside from custom receipts and used as an aid in exporting, but Secretary Wallace steadfastly refused to take any action. Since Jan. 6, 1936, he can't take any action anyway, so it looks as though there wouldn't be much the industry can look forward to this year in this direction.

Statistics are not yet available that would show the extent to which the Canadian reciprocity agreement has aided textile exports to that country. In general, the reaction of the industry has been favorable. It is apparent that the new rates will be of some assistance, but reductions are not great enough to make any decided difference in volume of trade.

A few of the changes that have been made in Canadian import duties are listed below:

| *Item* | *Old Duty* | *New Duty* | *% Reductions* |
|---|---|---|---|
| Certain textile machinery | 10% | 5% | 50% |
| Rovings, yarns, etc., cotton, singles or less, n.o.p. | 22½% & 4c lb. | 15 % & 3½c. lb. | 33 and 12½ |
| Woven fabrics, unbleached, etc., n.o.p. | 25 % & 4c. lb. | 20 % & 3½c. lb. | 20 and 12½ |
| Woven fabrics, cotton, printed, n.o.p. | 32½% & 4c lb. | 27½% & 3½c. lb. | 15 and 12½ |

The industry has not much to cheer about as the rates are still high, but it is at least grateful that it didn't get the worst of the deal, which has happened in other connections. The most encouraging feature is the virility with which the industry has been attacking the export question, as evidenced at the rally held in N. Y. Oct. 16.

# MILLS MODERNIZE

## *To meet modern competition*

MILLIONS of dollars were expended for new machinery, buildings and reorganization during the last two or three years by textile plants in all parts of the United States, and particularly in the South. This type of "tuning up," more than any other single factor, tends to prove conclusively that confidence in the future of the industry is greater now than it has been since 1929. Many mills, which postponed spending money during the periods of New Deal uncertainty, have already made plans to loosen their purse strings during 1936, and put their plants and machinery in position to meet competition of their neighbors, as well as that offered by the Japanese.

TEXTILE WORLD, it will be recalled, has sounded the note all along "to modernize or perish," and now the editors offer a concrete compilation of some of the work which has taken place during the period covered by this survey. It will be noted that a few outstanding modernization jobs are described in some detail. These jobs were selected more or less at random to serve as case-studies. In addition, certain highly industrialized areas in the vicinity of key cities are surveyed, as are States in which the mills are scattered over a wide territory.

Great care has been taken by the editors to make the compilation reflect only modernization trends of the recovery period. It has been authenticated from modernization records and from the companies themselves.

The entire presentation is offered as a cross-section of the modernization work that has been done in this industry, rather than as a complete survey. It is suggestive of what may—and should—be done by other mills which have not started yet.

## CONSTRUCTION DETAILS

SPRINGS COTTON MILLS, Lancaster, S. C.—This group undoubtedly has done the outstanding modernization job in the industry. Several million dollars were spent on new equipment, buildings, replacements and reorganization. Baldwin Mill, Chester, S. C., was reorganized from top to bottom, even the name being changed to Gayle Mill, in honor of Walter Gayle, of Charlotte, N. C., southern agent of Saco-Lowell Shops. According to a Christmas card sent by Captain Elliott Springs to his friends in the trade, some of the changes at Gayle plant were as follows:

"All the print cloths at the Gayle plant are made on a new Model X loom built to run over 200 picks per minute," a caption reads. "They are equipped with individual motors, midget feelers, 22-in. loom beam heads, pick clocks, Stafford thread cutters and vibrating whip rolls. The special towel loom runs 240 picks per minute. The rack on the E Model Loom shown above is operated by a simple winch to remove the cloth which then will be brushed on a four knife shearing machine and placed in the warehouse until the Japanese get a Blue Eagle.

"The bale breaker is equipped with an oil spray and a bale mixer.

"The one process pickers are equipped with blending reserves to insure uniform laps. Back of this is a gyrator, a vertical opener, and a Centrif-Air machine where the dirt is collected. The gyrator is fed from the opening room where the tax is collected.

"The cards are equipped with continuous strippers to insure maximum efficiency and prevent excess waste.

"The lap winder is equipped with an electric motion and the drawing frame has 16 ends up with five controlled drafting rolls to prevent any variation.

"The speeders are all equipped for folding roll controlled drafting. This is the only mill in the world manufacturing print cloth with one roving process instead of three. Other plants of the Springs Cotton Mills are similarly modernized.

"Every spinning frame operated by the Springs mills is equipped with long-draft aprons. The spindles in the Gayle plant have roller bearings and operate at 12,000 revolutions per minute with a front speed on 30s warp of 168 revolutions per minute, giving a breaking strength averaging 70 pounds. Each frame has a traveling overhead blower to prevent lint accumulation.

"The spoolers and warpers are the newest high-speed double-cheese type operating at 1,000 yards per minute. They avoid stretching the yarn and tie broken threads with weaver's knots. The slashers are mechanically controlled by recording instruments which automatically regulate the cooking and circulation of the new Corn Products high fluidity starch. The atmosphere is regulated by self cleaning atomizers, ideal high duty humidifiers and Amco automatic controls. All plants of the Springs mills are similarly equipped."

As mentioned in the Christmas card, every mill in the Springs group has been modernized almost to the limit. Long-draft aprons were put on every spinning frame, and much new spinning installed. The Lancaster, S. C., plant put in some 25,000 long-draft spindles and 464 Model X Draper looms. A steam power plant, with three large generators, was constructed at Chester to furnish power to Gayle, Eureka and

## PREPARATORY

**One-process picking, in general, was installed in most mills prior to the period covered by this survey. However, other features of the preparatory processes have been improved, and good examples of opening- and picking-room modernization may be seen at American Yarn & Processing Co., Whittenton Mfg. Co., Pacific Mills (Lawrence), Wiscassett Mills Co., Chicopee Mfg. Corp. of Ga., Manville Jenckes Corp., Dana Warp Mills, and J. & P. Coats of Pawtucket.**

Springstein plants. Barber-Colman spooling and warping, and 542 Model X Draper looms were put in the Gayle plant. A 50x150 ft. addition is now under construction to house looms and the machinery. Well-water systems at the Chester plants were replaced with a main line to the city water supply. Several plant additions, warehouses, village apartments and other buildings were constructed. A ball park and grandstand were built at the Kershaw, S. C., plant. A two-story addition, 373x83 ft., was erected at Fort Mill, S. C., to house looms and machinery. In addition to a huge amount of heavy machinery and auxiliary equipment such as individual motors, much used machinery in good condition was purchased. Sources of some of this equipment were Royal, Arctic, Androscoggin, Excelsior, General Cottons and other mills, particularly in New England.

PACIFIC MILLS, New England and South Carolina.—The Lawrence, Mass., plant purchased 42 printing machines from American Printing Co., Fall River, Mass., which gives it a total of nearly 20% of the machines in the cotton printing industry. The plant was put in a good state of repair. The mills at Columbia, S. C., are installing 1,750 used Model E looms, along with 600 new Model X Draper machines. Weaveroom floors were repaired and relaid, and the buildings painted and revamped where necessary. A single power plant was built to furnish steam for heating and slashing for both Granby and Olympia mills. Machinery included a new Babcock & Wilcox 300 hp. boiler, Combustion Engineering stoker, new pumps, instruments, piping, etc. Previously, each mill had its own power plant. The bleachery and finishing plant at Lyman, S. C., added several new printing machines, new soapers, dye machines, padders, jigs, tenter ranges, agers, and other finishing machinery. Two 268-hp. multiple-retort forced-draft boilers and Taylor stokers were set up in the power plant, which had to be extended in order to accommodate the equipment. A brick chimney, 10x225 ft., was built. The bleachery building was enlarged and the bleaching process changed somewhat. New finishing machinery was added. In 1933, a three-story warehouse, with 85,000 sq.ft. floor space, was built. A railway trestle was extended to facilitate shipping.

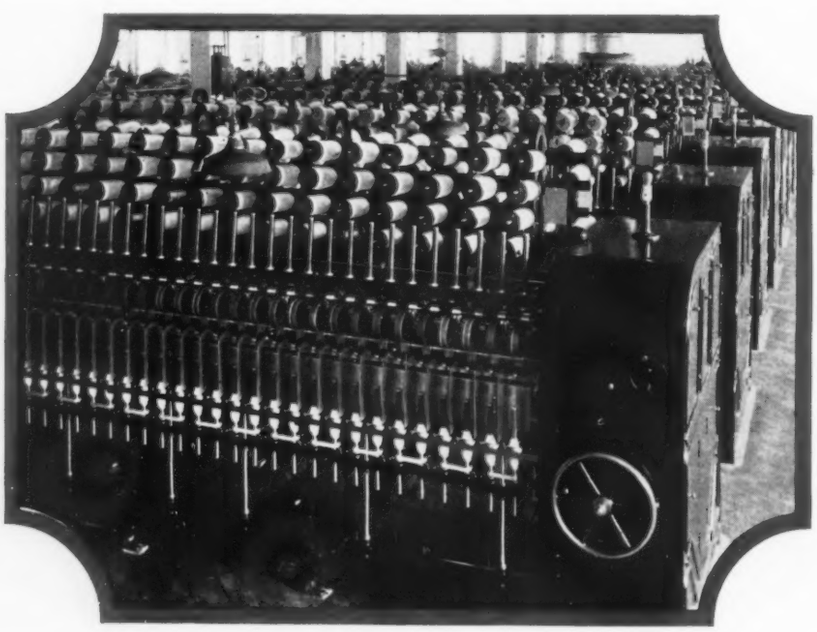
ERWIN COTTON MILLS CO., Durham, N. C.—Probably, the outstanding job in the Erwin group was at Mill No. 3, Cooleemee, N. C., where a complete reorganization took place. Approximately 43,000 long-draft Saco-Lowell spindles were installed, including 87 warp frames, 264 spindles, and 62 filling frames, 276 spindles. Reeves and Rockwood drives and individual Westinghouse motors were installed to drive the frames. Two Barber-Colman machines, installed in 1932, were modified to handle the long bobbins of the new frames. In the card room, eleven sliver lap machines were installed, along with eleven new controlled-draft drawing frames. Practically all of the card-room machinery was equipped with individual or group motor drives. New machinery and rearrangement in this room resulted in elimination of 37 fly frames, or 40% of those formerly in use. Weave rooms were rearranged to group together all looms of similar type, many of which were changed to individual motor drive. The mechanical drive in the picker room was replaced with individual motors. The old power system, consisting of water, steam and purchased electric power, was thrown out and a used General Electric generator put in operation utilizing available water power. It was deemed cheaper to purchase electricity than to build a modern steam-generating plant, and modern switchgear equipment was installed to control the incoming line, generator, and feeder circuits. The plant at Durham added a second story to the bleachery, increasing floor space approximately 20,000 sq.ft., at a reported cost of $25,000. A Super-Sanforizing range, built by Textile-Finishing Machinery Co., was installed. Eleven 5-room houses were built in the village at a cost of $27,000. The plant at Erwin, N. C., installed a $9,000 Westinghouse switchboard and a number of G.E. motors.

## SPINNING

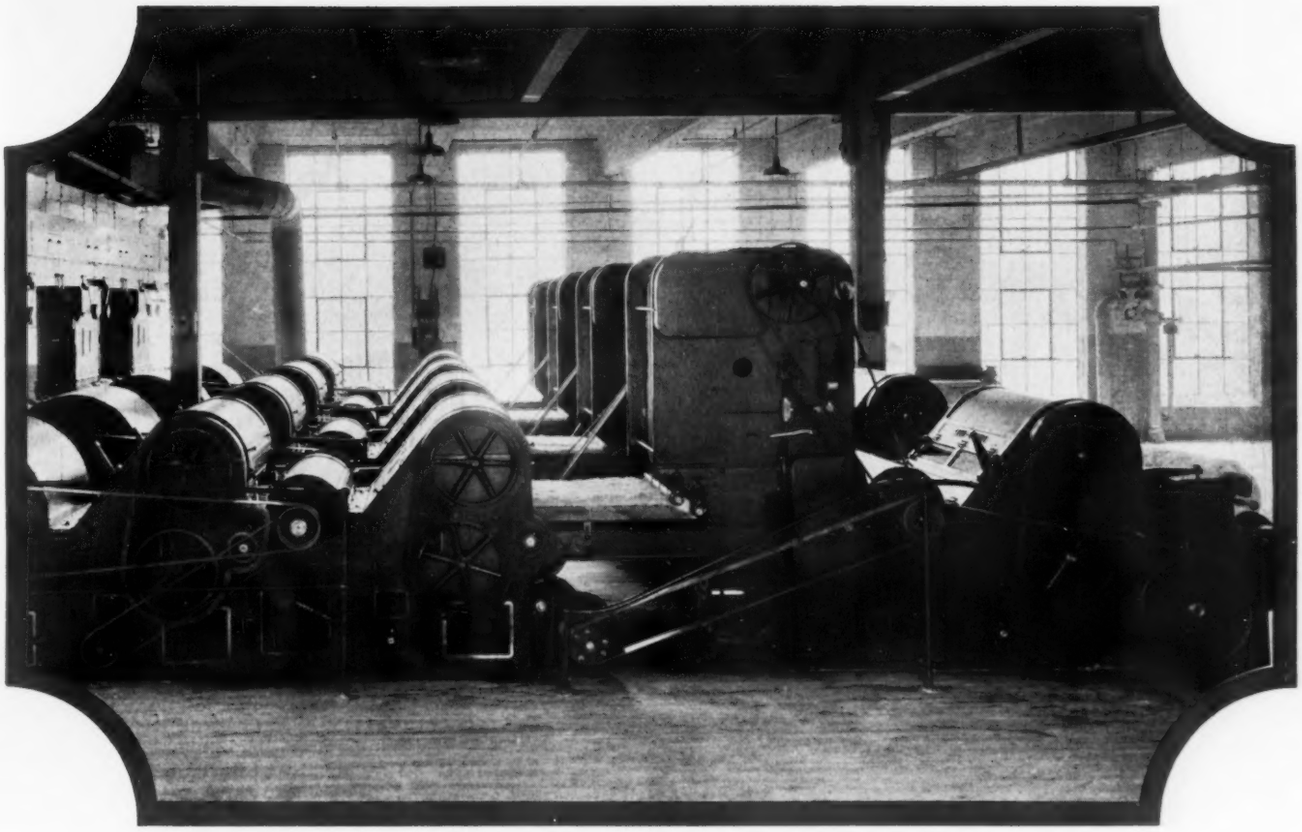
**The pinch of competition beginning to be felt by mills which have not already installed modern spinning equipment resulted in an enormous amount of such equipment being sold throughout the industry. Mills purchasing such machinery included Springs Cotton Mills, Erwin Cotton Mills Co., Whittenton Mfg. Co., Pepperell Mfg. Co., Dana Warp Mills, Proximity Mfg. Co., Cannon Mills, Rocky Mount Mills, Cross Cotton Mill, Brandon Corp., Victor-Monaghan Co., Watatic Spinning Mills, Hartsville Cotton Mills, Marion Mfg. Co., and Anderson Cotton Mills.**

BURLINGTON MILLS, Greensboro, N. C.—Continued to expand, adding several new plants to the group and building one from the ground up. New machinery included several hundred new Crompton & Knowles looms with complementary equipment for weaving and finishing rayon fabrics. Gloria Mills, Johnston City, Tenn., is reported to have installed equipment costing in excess of $250,000. About 250 looms were moved to the Covington, Va., plant and added to those already in operation, making this one of the largest units in the chain. Greensboro Weaving Co., a model Crompton & Knowles mill, was constructed new throughout. Cascade Rayon Mill, Mooresville, N. C., added 150 new looms. The High Point branch, formerly No. 2 mill of Stehlisilks Corp., added 200 new looms. H-W rayon yarn conditioners were installed at many of the plants. Burlington Dyeing & Finishing Co., Burlington, N. C., was put into first-class shape, where, in addition to much finishing equipment, a Hungerford & Terry zeolite water softener was installed.

ROCK HILL PRINTING & FINISHING CO., Rock Hill, S. C.—Completed three new buildings, two-story 75x200 ft., two-story 100x300 ft., and one-story 30x150 ft. Approximately 90,000 sq.ft. of floor space will be added, permitting installation of several new printing machines and bringing the total to 18. New equipment included dye jigs, cal-



*Variable speed applied to worsted ring spinning*



*One-process picking with new feed and reserve boxes, at Cannon Mills, Salisbury, N. C.*

enders, tenter range, agers, kiers, etc. Kemp high-compression burners were put on the singers. Color shop was enlarged. A steel warehouse affording 50,000 sq.ft. floor space was purchased. Within last three years, two boilers were added to power plant, 550 and 750 hp., necessitating an extension to the building. A water purifying system was purchased and installed. Several hundred thousand dollars were expended.

AMERICAN YARN & PROCESSING CO., Mt. Holly, N. C.—Picking departments in the spinning mills were completely revamped and new machinery installed, including Lummus bale mixer, Saco-Lowell bale breaker, Superior Yarn Mills cleaning trunk, Whitin C.O.B. machine and Saco-Lowell condenser. Carding departments were rearranged. Spinning frames were repaired, and drafts changed. Warping department was overhauled and spools painted special colors for identification. The mercerizing plant was reworked throughout. Mercerizing ranges were relined with Monel metal and a new yarn delivery device developed. Proctor & Schwartz dryers were rebuilt and equipped with Fulton Sylphon automatic thermostats. Belt drives on many machines were replaced with chain drives, largely Link Belt. Additional filters and new piping were put in the evaporating room. Three 25,000 gal. storage and mixing tanks were purchased. Quilling and winding rooms were overhauled, and a yarn testing laboratory established in the former. Chemical laboratories were brought up to date. Control instruments for testing pH were installed at strategic points in the plant. A new system of lighting the inspecting department was worked out.

## WEAVING

**Looms which operate at high speed and looms especially designed for rayon weaving were important items in many modernization programs. Mills installing new looms included Burlington Mills, Dunean Mills, Slater Mfg. Co., Wamsutta Mills, Springs Cotton Mills, Drayton Mills, Highland Mills, Brookside Mills, Blackstone Weaving Co., Cleveland Cloth Mills, Newmarket Mfg. Co., Pinehurst Silk Mills, Lawton Mills Corp., Phenix Mills Co., Pacific Mills, and Tupelo Cotton Mills.**

WEST POINT (Ga.) MFG. CO.—Lanett Bleachery & Dye Works, Lanett, Ala., erected a 77x93 ft., three-story and basement, mill-type addition to be used for storage and office space, at an estimated cost of $50,000. A group of Rice, Barton & Fales printing machines were installed, along with complementary equipment, to be used on heavy goods. Several houses were constructed and new land purchased for the village. Fairfax (Ala.) Mills built a one-story boiler plant, 20x42-ft., at a cost of over $20,000 with equipment. Twelve dwellings costing approximately $12,000 were added. A battery of Reeves drives was put in the spinning room. The Riverdale, Ala., plant constructed a community house. Every mill in the group was overhauled and much new machinery added. The supervisory forces have developed many mechanical devices which tend to increase manufacturing efficiency. These included slasher attachments, bobbin strippers, air conditioners, lighting arrangements, etc. Experiments related to variable-speed spinning are going forward.

PEPPERELL MFG. CO., New England and the South.—The plant at Lindale, Ga., constructed a three-story, 50x325 ft. dyehouse costing $100,000. Machinery included a mammoth Cocker indigo dyeing machine 225 ft. in length. Sanforizing machines, dye jigs, etc., were also added. Scroll cards in plant No. 1 were replaced with 35 new Saco-Lowell 40-in. cards. New long-draft spinning was bought. Machinery at the Opelika, Ala., plant was completely overhauled, and most of the spinning changed over to long draft. Some new long-draft frames were added. About 170 looms were shipped from Biddeford, Me., to Fall River, Mass. Several hundred thousand dollars spent for new machinery and improvements.

KENDALL CO., New England and the South—Addison Mills, Edgefield, S. C.,

installed Whitin long-draft spinning and controlled-draft drawing. All machinery was cleaned, repaired and reorganized. A basement room was converted into a weave shed and contains 112 Draper looms. The room was fitted with Bahnson humidifying apparatus. Mollohon Mfg. Co., Newberry, S. C., reroofed two weave sheds and installed an electric fire pump. The lighting system was revamped. Oakland Cotton Mills, Newberry, was completely reroofed, and repaired where necessary. The electric switchboard room was revamped. A water and sewer system in the village was completed, and modern plumbing fixtures installed in 25 houses.

CAROLINA COTTON & WOOLEN MILLS CO., Spray, N. C.—These mills made a large number of minor additions and several major improvements. The Fieldale, Va., plant changed-over 80 spinning frames to Whitin long-draft operation. An addition was built at Spray to house eight new twisters. Spinning and carding at Draper was fitted with Guillet taper-fitted neck. A boiler plant was constructed in the Spray-Draper area containing two new boilers. Present machinery was cleaned, repaired and modernized where this was possible.

PROXIMITY MFG. CO., Greensboro, N. C.—Mills of the Cone group have undergone a more or less continuous modernization program during the last few years. Proximity built a two-story, brick-and-steel addition costing about $100,000 to house 12,000 additional spindles. Old machinery was replaced with Abbott circulating cone winders. Other additions included a four-story brick-and-steel storage building costing about $50,000, and a three-story brick-and-steel chemical building costing about $5,500. Machinery in the print works was reorganized. Revolution Cotton Mills constructed a six-story brick-and-steel warehouse costing $52,500. Much new machinery was added and existing machinery revamped. Some 115 spinning motors were purchased.

CANNON MILLS CO., Kannapolis, N. C.—At a recent annual meeting of the board of directors, the mill was reported to have spent $1,500,000 for new machinery during the last two or three years. Probably much more than this has been spent on general modernization within the same length of time. Over $1,000,000 is estimated to have been spent on Wiscassett Mills Co., Albemarle, N. C., alone. New machinery purchased and installed at Wiscasset included 152 new Whitin long-draft spinning frames with individual motor drives, a large number of new Foster winders, new lighting systems throughout, new high-duty humidifier heads over the spinning, Westinghouse and General Electric motors for all new spinning, Saco-Lowell equipment for one-process picking, blending feeders in the picking rooms, new roving equipment, 12 additional combers in Mill No. 1, Firth-Smith bunchless automatic cleaners over all spinning and winding, new switchboards and switchgear equipment, etc. In addition, carding, warping, reeling, spinning, roving, drawing, and other machinery not replaced, was reconditioned completely. No new buildings of any importance were added although several of the present structures were connected by means of passageways, and plans were made for an addition to Mill No. 1. The entire mill was repainted where necessary. The Knitting Department of Wiscasset Mills installed 24 new knitting machines, of which 21 were Reading 20-section 46-gage full-fashioned machines, replacing a like number of 18-section 42-gage machines.

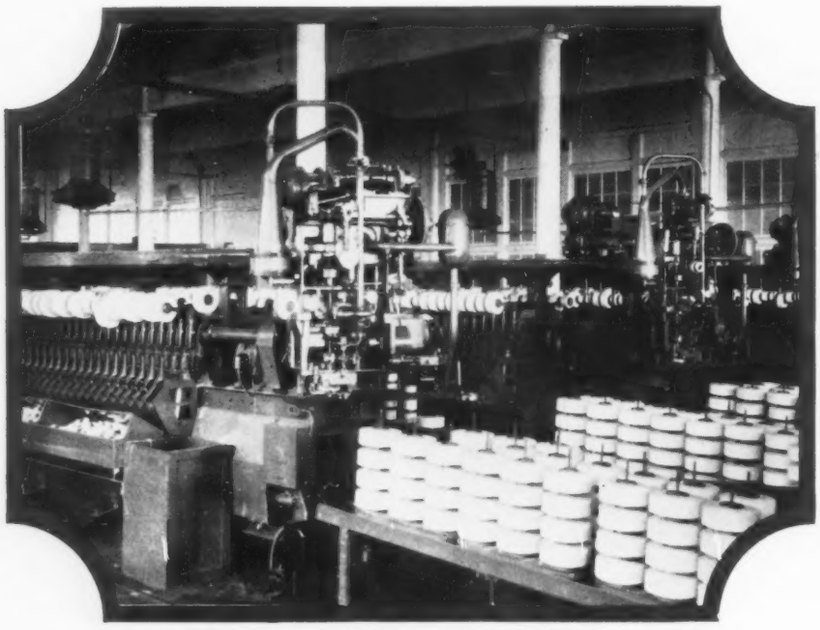
## KNITTING

**Finer gaged full-fashioned hosiery machines, circular machines which improve the shape of women's seamless stockings, half-hose machines which give increased patterning scope, and underwear and outerwear machines of far greater versatility all found favor. Mills installing new knitting machines and equipment included Archer Hosiery Mills, Davenport Hosiery Mills, Standard Hosiery Mills, Adams-Millis Corp., Hudson Silk Hosiery Co., Lowell Knitting Mills, Larkwood Silk Hosiery Mills, Cannon Mills Co., and many smaller plants.**

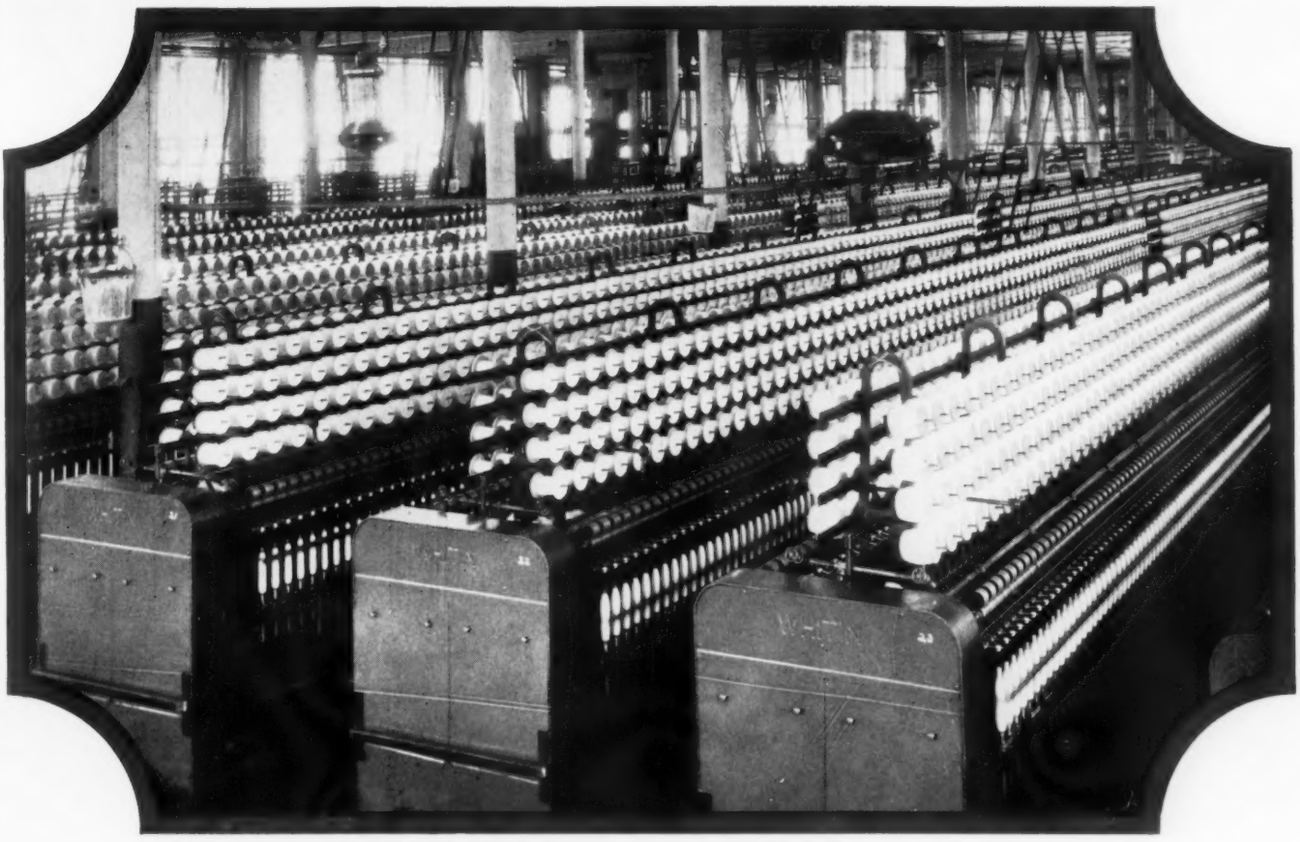
The other three were Hilscher devices. It is understood that when all contracts for knitting machines are filled the total will be about 180 full-fashioned machines. Plant No. 5, Concord, N. C., replaced old spinning equipment with new Saco-Lowell machines. Plant No. 6 installed a new 1,000-lb. double-circulating, raw-stock dyeing machine made by Morton Machine Works. Plant No. 4 replaced hand firing with Detroit stokers. Plant No. 9 constructed a new cotton warehouse, and installed new spinning to replace older machinery. One of the plants at Kannapolis put in Brownell twisting machinery purchased from Ranlo (N. C.) Mfg. Co.

ALABAMA, MISSISSIPPI, TEXAS—Dwight Mfg. Co., Alabama City, Ala., approved plans for a one-story addition, 130x140 ft., to house slashing equipment and other machinery. Cost estimated at more than $85,000. Avondale Mills, with plants in Alabama and other states, followed its usual practice of keeping all equipment as modern as possible. New spinning and other equipment was installed in many of the plants just prior to the period covered by this survey. Pomona Mfg. Co., Greensboro, N. C., was added to the group. Tupelo Cotton Mills, Tupelo, Miss., purchased 12 new speeders, 60 Model E. Draper looms and 13 Saco-Lowell cards. A fifteen-year bonded roof was put over the entire mill, and 25 new houses erected for operatives. Texas Textile Mills, Dallas, Tex., purchased one of the new super-sanforizing ranges made by Textile-Finishing Machinery Co. Piece-dyeing equipment for one of the plants was bought at a cost of over $35,000.

CONNECTICUT AND RHODE ISLAND—Lawton Mills Corp., Plainfield, Conn., has replaced more than 500 old looms with Draper Model X automatics. Interlaken Mills, Providence, R. I., is constructing an addition, 100x100 ft., to the finishing plant at Arkwright that will cost $70,000 with equipment. The building is part of the program calling for revamping of the power and electrical system Paragon



*Installation of four automatic spoolers*



*New twisters installed at American Yarn & Processing Co., Mt. Holly, N. C.*

Worsted Co., Providence, R. I., has constructed a three-story addition, 48x115 ft. Manville Jenckes Corp., Manville, R. I., has installed high-speed rayon warpers, four high-speed cotton slashers, high-speed warping equipment, cotton and rayon bobbin-stripping machines, a return-condensate steam system, a cotton-cloth shearer, and a tube conveyor for office papers. Total cost, including installation charges, was $88,181, and annual savings are stated to be $100,927. Franklin Rayon Corp., Providence, R. I., has constructed a new three-story and basement building, 100x160 ft., at a cost of $65,000, including equipment. The company has replaced all old-style dye tubs with stainless metal. J. & P. Coats, Pawtucket, R. I., has made a large installation of long-draft roving.

## FINISHING

**Practically every finishing plant in the South, and many in New England, spent a large amount of money on new equipment and improved processes. Mills tuning up dyeing, printing, or finishing departments included American Yarn & Processing Co., Tucapau Mills, West Point Mfg. Co., Pepperell Mfg. Co., Franklin Rayon Corp., Salisbury Cotton Mills, Union Bleachery, Southern Bleachery and Print Works, Inc., Pacific Mills, Rock Hill Printing & Finishing Co., Appleton Co., Texas Textile Mills, and Burlington Mills.**

GEORGIA—Highland Mills, Griffin, erected a one-, two-, and three-story addition, 105x240 ft., to house 400 additional looms. One-story machine shop building also erected. Entire project estimated at $90,000. Georgia-Kinkaid Mill No. 2, Griffin, junked its old speeders and replaced them with Woonsocket equipment. Old drawing frames were replaced with Whitin equipment in Mills Nos. 2 and 3. Gainesville Cotton Mills, Gainesville, installed 60 new spinning frames. Southern-Brighton Mills, Shannon, erected a two-story community building, 70x100 ft. Archer Hosiery Mills, Columbus, constructed one-story mill addition, 103x112 ft., and a one-story extension to the boiler plant. The building, sprinkler system, air-conditioning, etc., cost about $50,000, exclusive of new full-fashioned hosiery machines. Callaway Mills, LaGrange, Ga., erected a brick vocational school and laboratory. Management system was reorganized for efficiency. Uxbridge Worsted Co., Inc., Uxbridge, Mass., purchased Adams-Swirles Cotton Mills, Macon, and Standard Cotton Mills, Cedartown, threw out all old machinery and installed woolen equipment including super-cards and large-package woolen ring frames at latter and superdraft roving at former. Bibb Mfg. Co., Macon, installed considerable new equipment and is experimenting with variable-speed spinning drives. Atlanta Woolen Mills let contract for one-story addition and alterations to present buildings and equipment. Clark Thread Co., Austell, installed nine Reeves variable-speed drives on spinning. Chicopee Mfg. Corp. of Ga., Gainesville, Ga., modernized its picker room, installing Saco-Lowell equipment, including the new cleaning and blending reserve.

MASSACHUSETTS AND MAINE—Wamsutta Mills, New Bedford, Mass., has installed 400 Draper Model X automatic looms and high-speed warping machinery in the No. 5 Mill for the production of rayons. Watatic Spinning Co., Fitchburg, Mass., a new corporation, has purchased the buildings of the old Orswell Mills, containing 150,000 sq.ft. of floor space, and is installing modern equipment for straight-line production of combed knitting yarns. The plant will have 10,000 spindles, with preparatory equipment. Arnold Print Works, North Adams, Mass., has completed the first section of a new steam-electric power plant. Cochrane water-softening equipment and heaters have been installed by Turbine Equipment Co., New York. The boiler plant is 35x60 ft. and 62 ft. high. Riley Stoker Co., Worcester, Mass., furnished stoking and pulverizing equipment. Complete plans call for an expenditure of $250,000. Millbury Woolen Co., Millbury, Mass., has installed a filtration plant at a cost of $10,000. Tal-

bot Mills, North Billerica, Mass., has changed from coal to oil at a cost of $10,000.

Whittenton Mfg. Co., Taunton, Mass., is consolidating its best equipment, junking old machinery, and installing one-process picking and long draft spinning. Kezar Falls Woolen Co., Kezar Falls, Me., has installed humidifiers in its carding and spinning rooms. Pacific Mills, Worsted Division, Lawrence, Mass., is now operating the first commercial installation of the "frosted wool" process. The company also has a mechanical method for blending wool, and has replaced sixteen old cards with six new ones. It has also replaced a number of fulling mills and dye kettles with latest type devices and rebuilt and modernized many of its gill-boxes and cards. American Woolen Co., Lawrence, Mass., has purchased a continuous cloth-washing unit.

Lowell Knitting Mills, at Lowell, Mass., has added 62,000 sq.ft. of floor space and installed new equipment for the production of bathing suits. Ware Woolen Co., Ware, Mass., has let a contract for the building of a one- and two-story addition, with 7,000 sq.ft. of floor space, at an estimated cost of $28,500. Newmarket Mfg. Co., Lowell, Mass., is continuing its program of replacing old looms with the new models of Crompton & Knowles Loom Works. Dana Warp Mills, Westbrook, Me., has installed new cleaning and blending equipment together with a complement of long draft roving.

CHARLOTTE, N. C., AREA—Hudson Silk Hosiery Co., chartered recently at $1,500,000 purchased eight acres in the Oakhurst district and constructed a unit to house 30 full-fashioned knitting machines. One building is 107x400 ft., and cost about $40,000. The complete unit, including a one-story power plant, warehouse, etc., cost approximately $300,000 with machinery. Larkwood Silk Hosiery Mills built an addition to house 24 new full-fashioned machines at a cost of $350,000. Concord Knitting Co., Concord, N. C., erected a two-story addition to double its output of seamless hosiery.

Firestone Cotton Mills, Gastonia, N. C., branch, formerly the Loray plant of Manville-Jenckes Co., was reconditioned inside and out. A large crew of machinists and technicians from New England spent several weeks working on the machinery in the mill, and several carloads of machinery were discarded. The mill was painted. New porches, roofs, floors, plaster, paint and plumbing were applied to 63 houses in the village. Phenix Mills Co., Kings Mountain, N. C., replaced old looms with 130 Model XK, 44-in. Draper machines. Southern Friction Fabric Co., Charlotte, constructed a new brick-and-steel treating building and converted the old treating building into a finishing department. New machinery included an oven, grinding equipment, and drilling equipment.

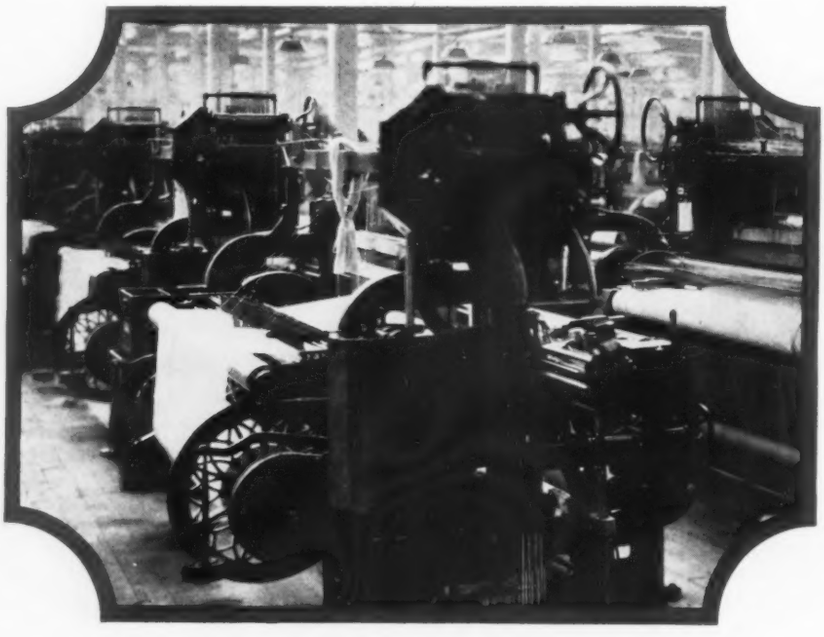
GREENSBORO - BURLINGTON, N. C., AREA—Dixie Throwing Co., Greensboro, constructed a 70x96 ft. addition, costing about $65,000 with machinery. Grabur Silk Mills, Inc., Burlington, added a second unit of Fletcher throwing equipment bought through W. A. Kennedy Co., Charlotte, N. C. Bogle & Watkins, Inc., Greensboro, recently organized, built a three-story mill unit, 60x100 ft., a one-story dye house, 40x40 ft., a one-story boiler house, 30x30 ft. Cost estimated at $150,000. Pinehurst Silk Mills, Hemp, installed 364 additional dobby looms. Salisbury Cotton Mills, Salisbury, N. C., installed a Morrison Sanforizing machine and a Butterworth package dyeing machine. Standard Hosiery Mills, Alamance, N. C., installed 60 new Banner and Scott & Williams knitting machines bringing the total to 250. A sawtooth addition was constructed. Eight new full-fashioned machines were purchased and a zeolite water softener installed. Total cost estimated at more than $100,000. Chatham Mfg. Co., Elkin, N. C., added a 1,000 kw. steam turbine generator to its power plant and two 350 h.p. boilers. Rocky Mount Mills, Rocky Mt., N. C., converted 16,000 spindles to long draft, replaced 24 old frames with new, installed several high-speed winders, replaced one-half of twisters with new large-package machines, constructed a new warehouse, and renovated the village. Program estimated at $125,000. Adams-Millis Corp., High Point, N. C., installed several full-fashioned Reading knitting machines and other equipment, keeping its plant modern in every respect.

HICKORY, N. C., AREA—Whisnant Hosiery Mills built an addition costing $2,500. G.&H. Hosiery Mills constructed a building costing $1,800. E. W. Walton Co. built a one-story addition, 40x140 ft., costing $2,400, to house boiler and dye plant. Brown Hosiery Mill constructed a small boiler room. Lyerly Full-Fashioned Hosiery Mills spent about $10,000 on construction work. Stevens Hosiery Mills spent several thousand dollars on construction. Catawba Hosiery Mills, recently organized, erected a 30x40 ft. building to house machinery.

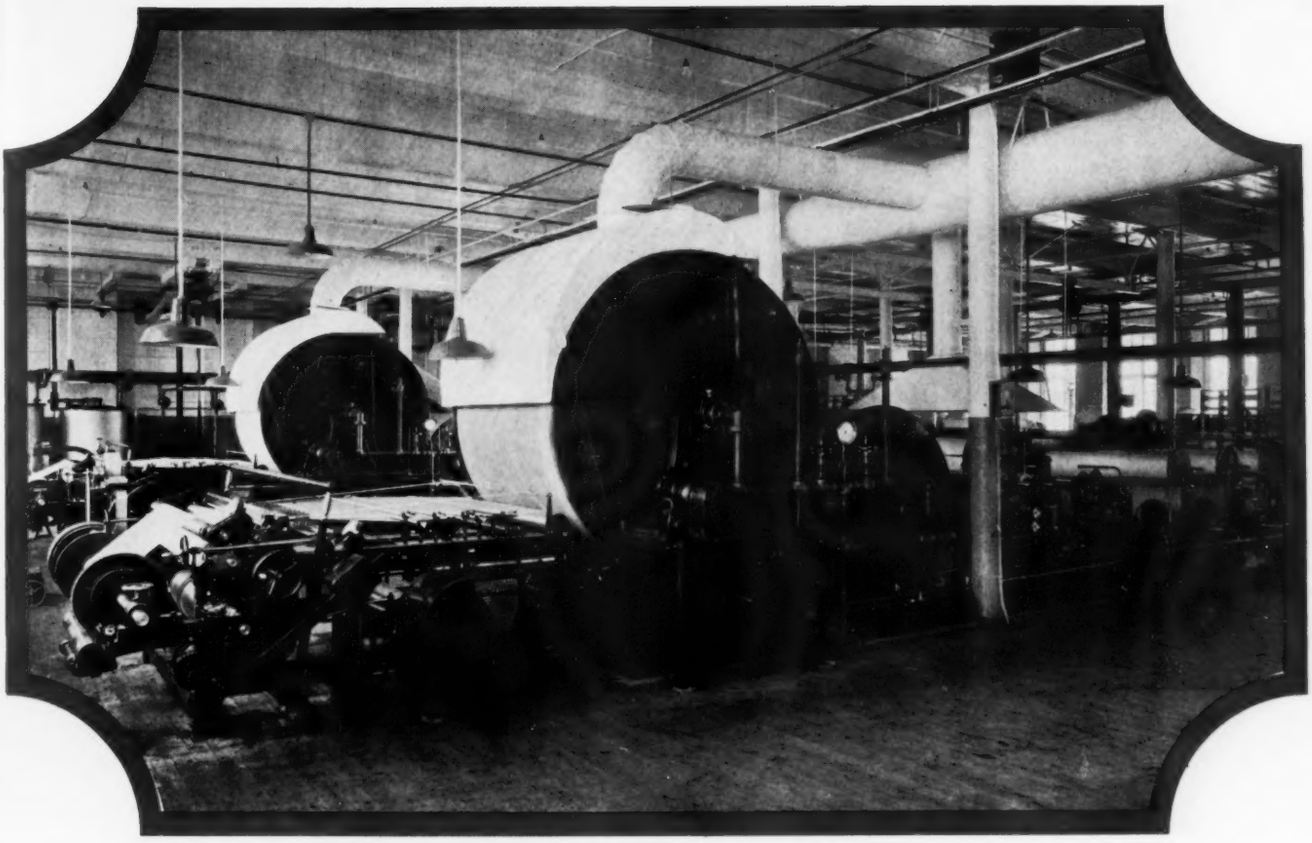
MARION-SHELBY, N. C., AREA—Cleveland Cloth Mills, Shelby, built a one-story addition, 120x300 ft., to house Crompton & Knowles looms driven by General Electric motors. A 40x80 ft. storage building was put up. Laboratory apparatus was bought. Elizabeth James Mills, Marion, approved plans for extensions and improvements to cost $40,000. Cross Cotton Mill, Marion, constructed a one-story addition to be equipped for the production of fine combed yarns, costing over $25,000. New spindles and general revamping of machinery cost about $125,000. Clinchfield Mfg. Co., Marion, was reroofed. Cliffside Mills, Cliffside, N. C., installed an

## POWER PLANT

**Boilers, stokers, and control instruments found their way into many power plants during the last one or two years. Mills purchasing power-plant equipment, or building power plants outright, included West Point Mfg. Co., Rock Hill Printing & Finishing Co., Chatham Mfg. Co., Springs Cotton Mills, Arnold Print Works, Carolina Cotton & Woolen Mills Co., Pacific Mills, Cannon Mills Co., Drayton Mills, and Talbot Mills.**



*Large installation of worsted automatic looms*



*New "stretch-control" slashers at Manville-Jenckes Co., Manville, R. I.*

exhaust system, and revamped slashers and size vats. Two new water wheels were put in.

NEW YORK - PENNSYLVANIA AREA—Beaunit Weaving Mills, Cohoes, N. Y., added 100 looms, bringing its total to 650. Present floor space and finishing equipment adequate to care for additional production. No-Mend Hosiery Mills, Lebanon, Pa., built an addition costing $150,000, and added machinery to increase production by 25%. Westchester Hosiery Mills, Westchester, Pa., installed 10 high-speed Lieberknecht full-fashioned hosiery machines with 3-carrier attachments, doubling production and number of operatives. Raynit Mills, formerly of Brooklyn, N. Y., acquired the plant vacated by E. H. Kluge Weaving Co., at 721 Hudson Ave., West New York, N. J., and moved into it the Brooklyn machinery and additional machines. Machinery at the Brooklyn plant included 190 spring-needle knitting machines, 10 latch-needle machines and 40 winders for knitted cloth. At the new location, machinery includes 250 spring-needle machines, 25 ribbers, 40 winders and dyeing, bleaching and finishing equipment. Total expenditure estimated at $100,000.

ANDERSON, S. C., AREA—Anderson Cotton Mills, Anderson, completed installation of 16,128 additional spindles, bringing the total to 85,528 spindles and 1,920 looms. Gossett Mills, Anderson, built a one-story addition, 64x105 ft., to be used as a rayon division. Looms were moved in from other plants, and 108 Model XK Draper looms were installed. A sewerage system was constructed in the village, and modern plumbing put in the houses. Appleton Co., Anderson, constructed a new one-story bleachery, 110x280 ft., and installed in it new finishing machinery, supplementing that on hand. Building and equipment were estimated to cost over $150,000. A new steam power plant was built prior to the bleachery. A large battery of Rockwood drives was installed. Spinning was overhauled and reconditioned. Wellington Mills, Inc., with plants in various parts of the South, purchased Gluck Mills, Anderson, for $248,670. Improvements and machinery estimated to cost $60,000. Steam power was replaced with electric, and the entire mill is being electrified.

GREENVILLE, S. C., AREA—Dunean Mills constructed a small one-story addition to house slashers. Several hundred new Crompton & Knowles looms were added, and all cotton machinery discarded. A Proctor & Schwartz continuous drying machine was purchased. Judson Mills, Greenville, repainted approximately 700 houses inside and out. Victor Monagan Co., Greenville, installed 32 Whitin warp spinning frames, 320 spindles, and 36 frames, 276 spindles. The Walhalla, S. C., plant installed 50 Whitin frames, 288 spindles. Brandon Corp., Greenville, installed in its Woodruff, S. C., plant 80 Whitin spinning frames, 276 spindles. Calhoun Mills, Calhoun Falls, S. C., installed 8 Whitin warp frames, 240 spindles, and long draft attachments for 70 frames, 256 spindles. Hartsville Cotton Mills, Hartsville, S. C., installed 58 Saco-Lowell warp frames, 288 spindles, and 48 deliveries of Saco-Lowell controlled-draft drawing. Union Bleachery, Greenville, constructed a 10,800 sq. ft. dyehouse extension to house rayon and cotton printing machinery for the Pal-

## LIGHTING

**Growing recognition, perhaps belated, of the economies possible in modern group and individual-motor drives, along with increased interest in variable-speed spinning, caused a spurt in sales of motors and improved transmission equipment, including motor controls and other electrical devices. High-intensity lamps and new lighting arrangements met with great favor in plants striving for the ultimate in efficiency. Mills installing such equipment included Erwin Cotton Mills Co., Proximity Mfg. Co., Appleton Co., Clark Thread Co. of Ga., Wellington Mills, Inc., Cannon Mills, Co., Anderson Cotton Mills, Kendall Co., and Springs Cotton Mills.**

metto Print Works. Machinery was shipped from Jewett City, Conn., by Aspinook Finishing Co. which is interested in the newly organized printing concern. A five-bed filter plant was built, each with a capacity of 600 gal. per min. Southern Bleachery & Print Works, Inc., Taylors, S. C., constructed a 50x100 ft. addition to the bleachery. Slater Mfg. Co., Slater, S. C., sold most of its cotton machinery and installed rayon equipment including 100 new Draper looms. Winnsboro Mills, Winnsboro, S. C., installed several Barber-Colman high-speed spoolers and warpers, a battery of Rockwood drives. Experiments are going forward with high-intensity lighting.

SPARTANBURG, S. C., AREA—Spartan Mills, Spartanburg, installed long-draft spinning throughout. Drayton Mills added several hundred Draper high-speed looms, and repaired its boiler plant. Tucapau Mills, Tucapau, S. C., converted a laundry into a bleachery for crash towels, built a storage building, and installed a mechanical filtering and water softening plant with Permutit equipment.

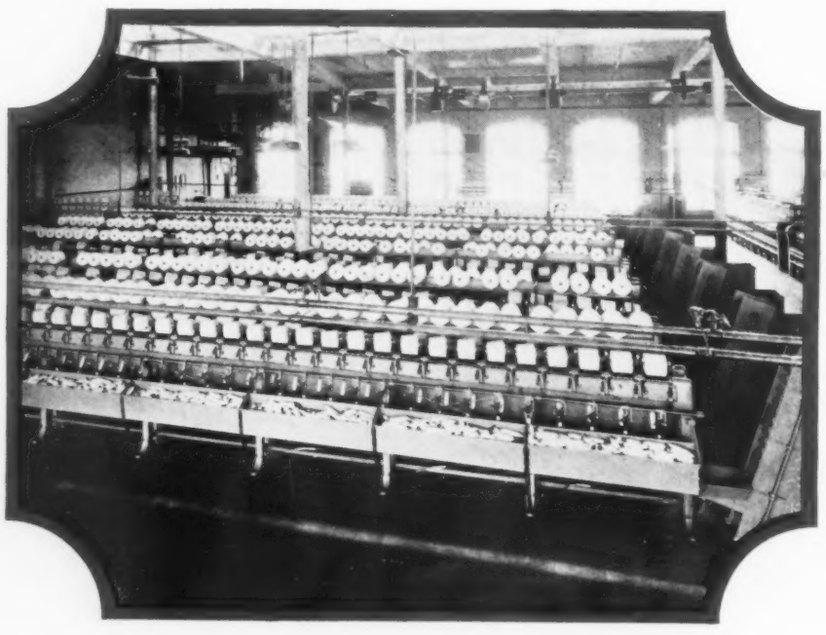
TENNESSEE—Ashe Hosiery Mills, Knoxville, expanded its floor space and bought 100 additional knitting machines at a reported cost of $60,000, bringing the total number of machines to 500. Brookside Mills, Knoxville, added 450 new Draper looms and new spinning equipment. Dixie Mercerizing Co., Lupton City, added 15,000 spindles in 1933. Davenport Hosiery Mills, Inc., Chattanooga, added a number of full-fashioned hosiery machines. May Hosiery Mills, Nashville, planned to construct a one-story addition, 60x150 ft., to house 150 knitting machines. Cost estimated at $60,000.

VIRGINIA — Powhatan Converting Works, Martinsville, recently organized and capitalized at $1,000,000, purchased 50 acres of land and constructed several buildings. The main structure, 220x260 ft., cost over $150,000, including machinery to dye and finish rayon goods. Blue Ridge Co., Inc., Glasgow, also a new concern, completed a one-story structure containing about 80,000 sq.ft. floor space. Plant manufactures carpets and rugs and is said to have cost $350,000 with equipment. Blackstone Weaving Co., Blackstone, constructed a new one-story addition to house 144 looms. A one-story steam power house was built. This plant, recently organized and capitalized at $1,000,000, planned to spend over $350,000 on buildings and equipment. Riverside & Dan River Cotton Mills, Inc., Danville, Va., consolidated card rooms, weave rooms, and other departments. Machinery was overhauled and much new equipment added.

RAYON MANUFACTURERS — Du-pont Rayon Co. constructed an addition at Ampthill, Va., said to cost approximately $5,000,000. Other activity at Ampthill included erection of small buildings, installation of a Sturtevant air conditioning system with a capacity of 500,000 cu.ft. per min. At the Old Hickory, Tenn., unit, 160 dwellings were constructed for operatives. An addition was made to the mill. The laboratory was revamped. At the Waynesboro, Va., plant, a unit costing about $500,000 was constructed. The village was increased to care for additional employees. American Enka Corp., Enka, N. C., erected a plant addition said to cost $1,000,000 with equipment. Celanese Corp. of America, Inc., Amcelle, Md., built a two- and three-story addition, 112x425 ft., and a two-story basement cafeteria building. Entire expansion program estimated at $500,000. Tubize Chatillon Corp. extended and improved its Rome, Ga., plant. Viscose Co. of America, Inc., planned a power plant at its Marcus Hook, Pa., plant. Machinery included turbo-generator units and auxiliary equipment costing $500,000 with plant. The Roanoke, Va., unit announced plans for a caustic soda reclaiming plant to cost $100,000. Industrial Rayon Corp., Cleveland, Ohio, was reported to have concluded arrangements to construct a mill at Elkton, Md., costing over $600,000. Several hundred thousand dollars were said to have been spent on new buildings and equipment at Cleveland. Woonsocket Rayon Corp. (Manville Jenckes Corp.), Woonsocket, R. I., has installed additional spinning capacity, a new evaporator and miscellaneous equipment, improved the refrigerator plant, and installed a cake finishing process, at a total cost of $58,569. Annual savings are figured to be $159,775.

## BUILDINGS

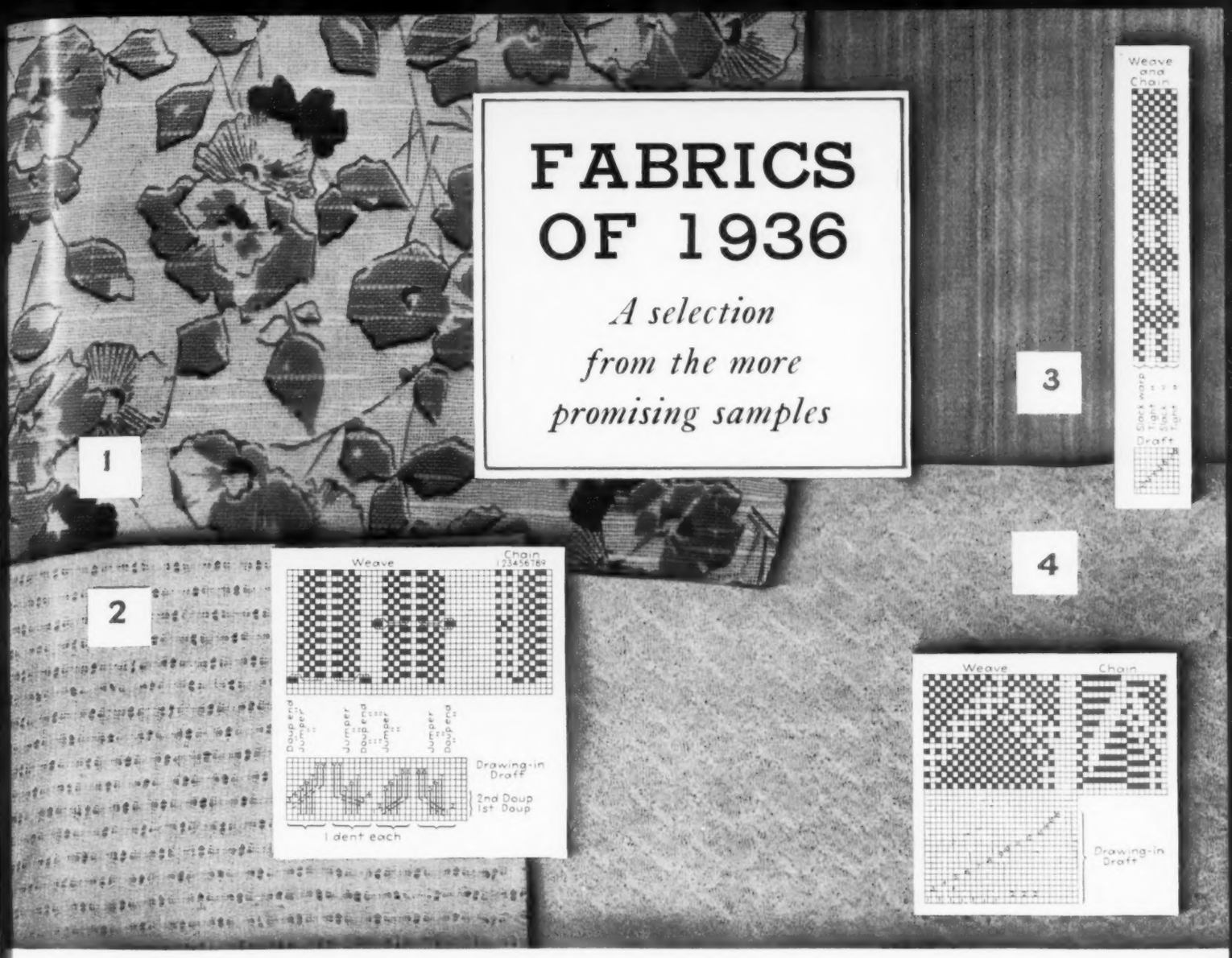
**To name mills which have made additions and improvements to their buildings, would be to list almost every mill described in this survey. Every type of mill building on record was put up during the last one or two years. An outstanding example of weave-room construction can be seen at Cleveland Cloth Mills where a special steel truss support was developed to eliminate central columns and to afford an extra supply of light. Special attention was given to the spacing of the few columns necessary in order that all available space could be occupied by looms. A unique use of tile in wall construction went into the new Grabur Silk Mills. The rayon yarn producers probably built the most massive units of any branch of the industry. Greensboro Weaving Co. represents the latest thing in rayon mills. Appleton Co. erected a modern bleachery building with especial attention to windows and lighting. Several wool goods mills in New England have added floor space including Ware Woolen Mills and Paragon Worsted Mills.**



*Battery of new winders with rotary guides*

# FABRICS OF 1936

*A selection from the more promising samples*




IT WILL be a bumpy year for textiles, technically speaking—or to be more technical, and certainly more correctly technical, the fabrics of 1936 will contain considerable quantities of seed, nub, and slub yarns. As Mr. Mattmann pointed out in a recent article, the consumer is getting tired of the approach to perfection afforded by modern machines and methods and wants to see some of the horribly lumpy and irregular yarn her great-grandmother spun. Well, here it is, this year; and if the consumer wants to pay money for it (it costs more to produce bad yarn now-a-days), it's certainly all right with us in the industry. Fabrics 1, 7, 8, 9, and 11 are examples.

Knit fabrics are still improving in their appeal to the consumer. The knitted dress fabrics are growing constantly more attractive and varied in design. They are better made as time goes on (note fabric 21, as an example), and their cost is still declining. Evidence of their current standing is offered by the fact that weavers are now endeavoring to imitate knit goods, as illustrated by fabric 2. Practically all of the important half-hose lines this year contain the short sock—note No. 17.

As usual, we have had considerable help in selecting the samples and constructions contained in this survey; and we wish to acknowledge with gratitude the advice, samples, and constructions supplied by the following: Nos. 1 to 5, inclusive, Harry L. Robertshaw; 6 to 10, R. A. C. Scott; 11, Carl C. Mattmann, Jr., A. M. Tenney Associates; 12, Fabric Development, Du Pont Rayon Co.; 13, W. H. Six, American Bemberg Corp.; 14, 15, and 16, John Picone; 17, H. W. Scruton, Interwoven Stocking Co.; 18, J. V. Conlin, Holeproof Hosiery Co.; 19, Richard L. Frost, Allen-A Co.; 20, F. C. Zillman, Phoenix Hosiery Co.; 21 and 22, Louis G. Goldenberg, Advance Rayon Fabrics, Brooklyn, N. Y.; 23 and 24, I. A. Wyner Co., New York.

**FABRIC CONSTRUCTIONS**

1. *Cotton Slub-Yarn Dress Fabric.* 40″, 44x40, 3.65 yd. per lb. Average 16s cotton slub yarn both warp and filling. Plain weave. Made in both light-weight lawns and heavy, coarse yarns for both piece dye and printing. This type of fabric is now in extensive production.

2. *Open Leno Work and Meshes* have a bright future for spring and summer, both in eyelet and imitation-knit fabrics. Sample shown is 38″, 72x60, 30s cotton warp, 40s cotton filling. See weave.

3. *All-Cotton Matelassé Type* for dresses and sport wear. Solid dyed and printed. Warp drawn in 2 ends tight beam and 2 ends slack beam. 38″, 80x76, 30s tight warp (7% contraction), 30s slack warp (28% contraction), 40s filling. See weave.

4. *Rough Crepe Type* for spring and fall sports dresses in solid colors and prints. 40½″, 48x48. Warp: 15s cotton crepe, 6 ends Z-twist and 6 ends S-twist. Filling: 150/40 bright rayon. See weave.

5. *Fine All-Cotton Crepe* for afternoon wear. Finished in solid colors. 45″, 145x88. Warp: 60s combed. Filling: 80s combed and 45s combed crepe, shot 2 picks 80s face and 2 picks 45s crepe back. See weave.

6. *Worsted Novelty Suiting.* 16 reed, 4 in dent, 66″ in loom, 4224 ends, 68 picks, finished 8 to 8½ oz., 54″. Warp and filling: 16.8-typp (1/30s) 64 to 70s quality worsted. Pattern for both warp and filling: 2 of white, 4 of black, brown, blue, or green. Weave as shown, straight draw. Color effect as shown. Owing to 6-end pattern and 8-end weave, effect repeats on 24 ends and picks; hence small spots run in sateen order. Usual dress-goods finish. Very effective, yet conservative, style for better-class suiting trade—especially tailor-made suits.

7. *Novelty Ratiné Suiting.* 15 reed, 2 in dent, 68″ in loom, 2040 ends, 34 picks, finished 9 oz., 54/56″. Yarn *A* in following pattern for warp and filling is 11.2-typp (1/20s) worsted Z-twist ordinary, while *B* is a worsted ratiné composed of 16.8-typp (1/30s) Z-twist ordinary twisted approximately 28 turns per inch with 16.8-typp (1/30s) S-twist ordinary. (In twisting the ratiné, about 1½ yd. of S-twist is allowed to 1 yd. of Z-twist, and 1 set of rollers is stopped for a few turns every 2 or 3″; thus a small nub is formed. The resultant count is about 5.6-typp, 10s, worsted.)

| | | | | | | |
|---|---|---|---|---|---|---|
| *A*, white..... | 2 | 2 | 2 | 1 | 1 | = 8 |
| *B*, white..... | 1 | 1 | 2 | 2 | 2 | = 8 |

Plain weave. Piece dyed and usual worsted dress-goods finish. Extra width allowed for shrinkage. Indistinct pattern effect is imparted by ratiné nub yarns.

8. *Fancy Sports Coating.* 5 reed, 2 in dent, 68″ in loom, 680 ends, 12 picks, finished 14 oz., 54/56″ wide.

| Warp pattern: | 3X | | | 3X | | |
|---|---|---|---|---|---|---|
| 2-typp, brown..... | 2 | 2 | 1 | 2 | 1 | = 16 |
| 1.2-typp, slubby yarn, white.. | 2 | 1 | 2 | 2 | 1 | = 16 |

| Filling pattern: | 3X | | | 3X | | |
|---|---|---|---|---|---|---|
| 2-typp, brown..... | 2 | 2 | 1 | 2 | 1 | = 16 |
| 1.2-typp, slubby yarn, white.. | 1 | 1 | 1 | 1 | 1 | = 8 |
| 1.2-typp, slubby yarn, tan.... | 1 | 1 | 1 | 1 | | = 8 |

Note: 2-typp is equivalent to 1¼-run and 6⅝-cut; 1.2-typp is equivalent to ⅝-run and 4-cut.

See weave. Scour finish only. This attractive sports number could be varied by the use of different colors, some bright, in warp and filling.

9. *Fancy Sports Suiting or Coating.* 5 reed, 2 in dent, 68″ in loom, 680 ends, 12 picks, finished 12½/13 oz., 54/56″ wide.

Warp and Filling Pattern (except that in filling white is substituted for gray, and black is substituted for red in the red-and-white):

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. Light gray..... | 3 | 2 | 2 | 2 | 2 | = 11 |
| 2. Red and white..... | 1 | | 1 | 1 | | = 3 |
| 3. Black and white..... | | 1 | | | 1 | = 2 |

No. 1 yarn is a mixture of 10% black, 80% white, and 10% white nubs, with an approximate count of 2-typp (1¼-run, 6⅝-cut), S-twist.

No. 2 yarn is a 5.6-typp (3½-run, 18⅝-cut) S-twist red (black in the filling) twisted about 3 turns per inch Z with a 5.6-typp (3½-run, 18⅝-cut) S-twist white, this combination in turn being twisted S about 20 turns per inch with a 2/40s (2/33.6-typp) black cotton, using a 1/20s (16.8-typp) cotton black binder Z-twist, 10 turns per inch. Resultant count is approximately 14.4-typp (9-run, 48-cut).

No. 3 yarn consists of a 5.6-typp (3½-run, 18⅝-cut) Z-twist black yarn twisted about 15 turns per inch with a 5.6-typp (3½-run, 18⅝-cut) S-twist white, the white forming nubs every 2½″, using 1/20s (16.8-typp) cotton black for binder, Z-twist, 7 turns per inch. Resultant count is approximately 1.8-typp (1⅛-run, 6-cut).

Plain weave. Scour finish only. If same color scheme were used in filling as in warp, a skeleton check effect would result.

10. *Dress Coating, Velour Finish.* 12 reed, 4 in dent, 70″ in loom, 3360 ends, 32 picks, finished 15/16 oz., 56″, 10% finished length shrinkage. Warp: 16.8-typp (1/30s) worsted, 64s quality, solid. Filling: 2.8-typp (1⅞-run, 9½-cut) woolen, solid, blended of short stock of good felting quality. Weave: 1/3 move 1, filling flush.

Give 2 or 3 turns on napper before scouring, then scour, full to width 58″ and about 5½″ in length (i.e., 5½″ per 36″), scour and rinse, using a penetrant to speed action, wet nap until very dense cover obtained, dye to shade, shear until short uniform pile obtained, brush, give light press and steam on face.

By combining this weave with plain weave, small novelty effects can be had which, after napping, are subdued enough to prevent gaudiness.

11. *Acetate and Rayon Sheer.* Set 50″ in reed, 112 ends, 28/4/1 reed, 2-beam job, 3 ends of 100/34-den dull acetate, 4 turns, from first beam; and 1 end of 100/60-den. rayon crepe, 50/55 turns, laid 2S and 2Z, from second beam. Filling: 56 picks of 200/120-den. rayon crepe, 45 turns, 2S and 2Z. Weave on 12 harnesses as shown.

12. *Spun-Rayon Sportwear.* Reed width: 45½″. Loom construction: 52x44 (or a 26/2 reed). Warp: 2/50 spun rayon with 10% white wool blend, warp twist; and 300-den., 100-fil., 4-turn dull acetate. Filling: 30/1 spun rayon with 10% white alpaca, filling twist; and 300-den., 100-fil., 4-turn dull acetate. Plain weave.

| Warp pattern: | | | | | |
|---|---|---|---|---|---|
| Spun rayon..... | 18 | 2 | 2 | 36 | 18 |
| Acetate..... | 2 | 2 | 2 | 8 | |

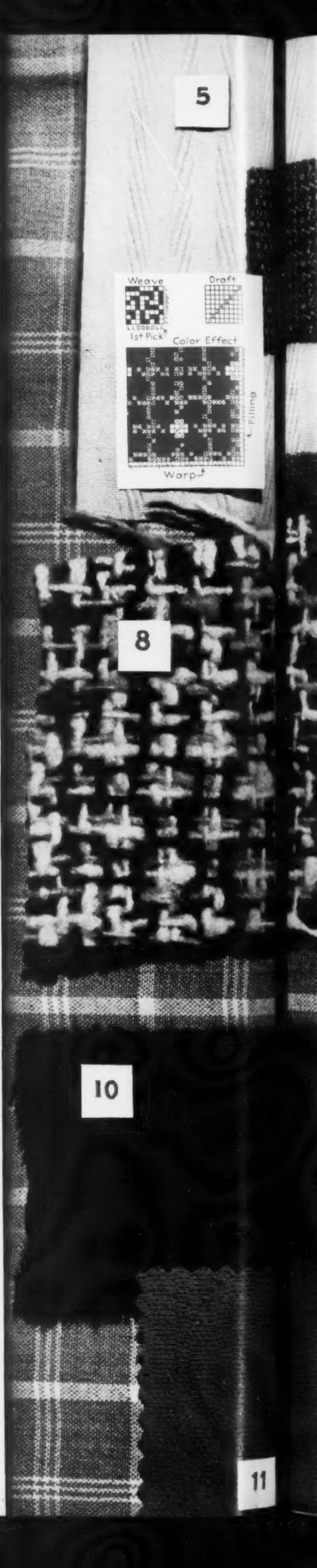
| Filling pattern: | | | | | |
|---|---|---|---|---|---|
| Spun Rayon..... | 14 | 2 | 2 | 28 | 14 |
| Acetate..... | 2 | 2 | 2 | 6 | |

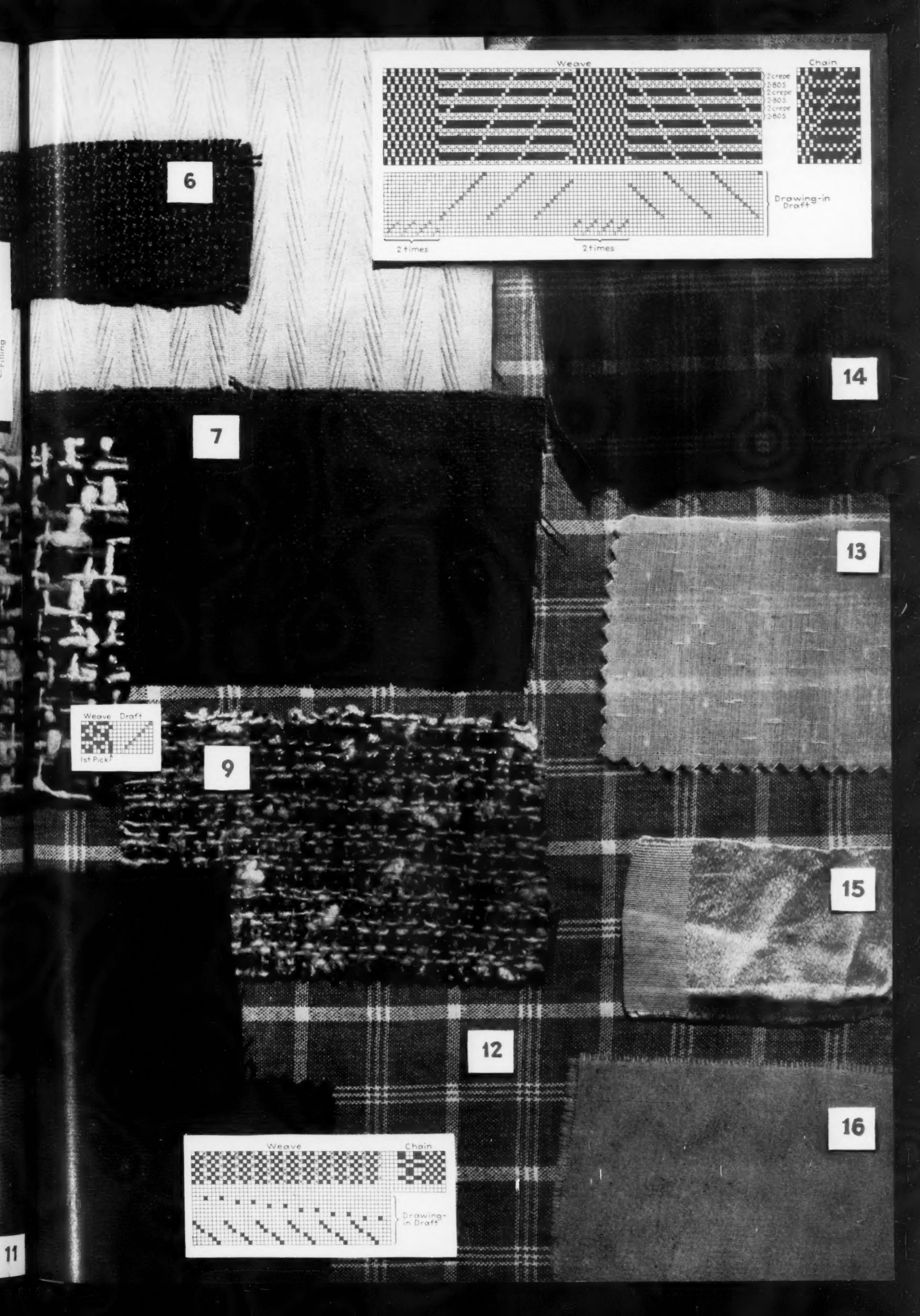
13. *Triple Sheer with Nub Yarn.* Reed width: 46½″. Loom construction: 96x72. Reed: 32/3/1. Finished width: 39″. Warp: 75-den., 60-fil., cuprammonium crepe, 57½ turns, 2S and 2Z; and Clifton cuprammonium nub yarn style No. 1858. Filling: 75-den., 60-fil., cuprammonium yarn, no twist; and same nub yarn as in warp. Weave: Regular triple sheer.

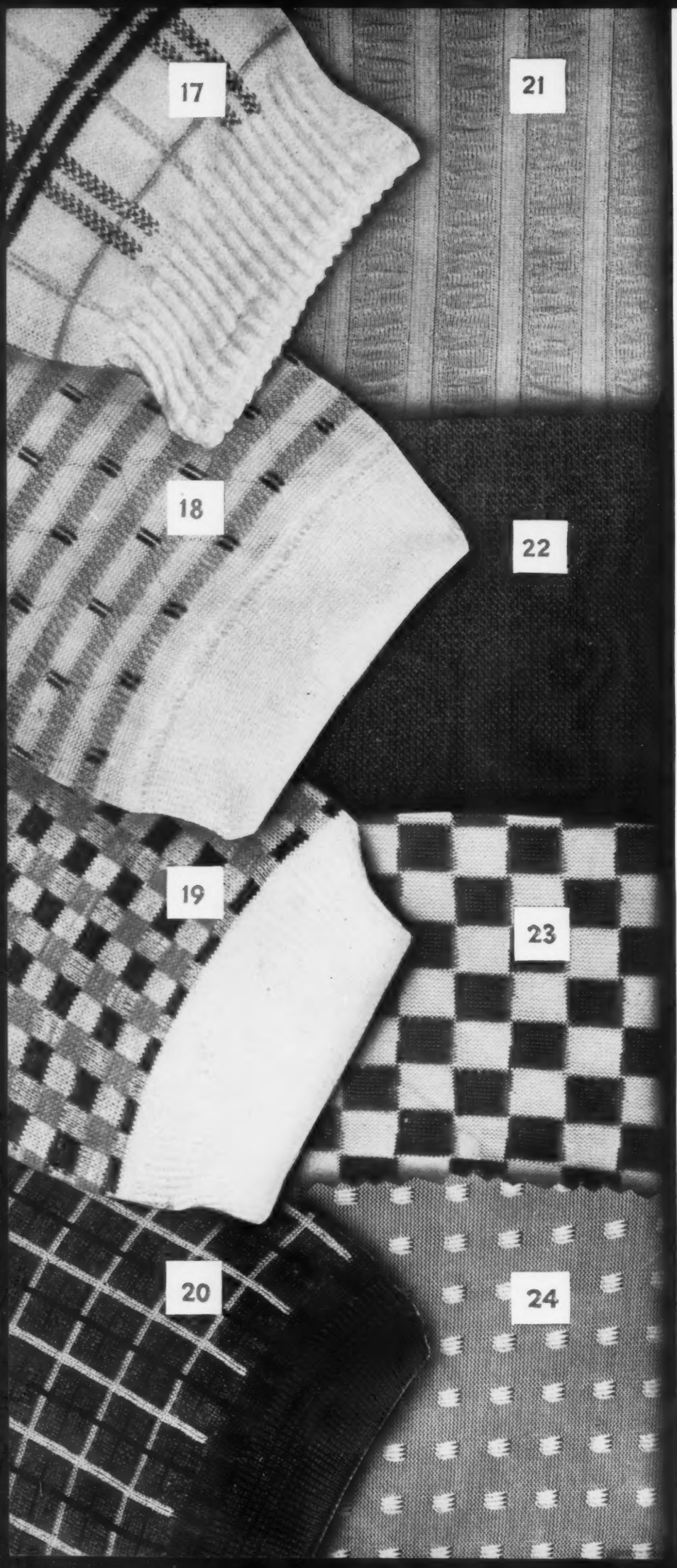
14. *Triple-Sheer Georgette.* Set 47½″ in reed, 60 reed, 2/1 per dent, 5760/1 ends in warp, 24/2/2 edges. Warp: 2-thread 20/22, 65/70 turns, 1 S and 1 Z. Filling: 96 picks same as warp, 2 S and 2 Z.

15. *Heavy Eight-Shaft Satin Crepe.* Set 43″ in reed, 50 reed, 8/2 per dent, 34,400/1 or 17,200/2 ends of 20/22 Japan in warp, 36/16/2 edges. Filling: 108 picks of 4-thread Japan 20/22, 50/55 turns, 2 S and 2 Z. Sample shown is in gray.

16. *Medium Crepe.* Set 43″ in reed, 55 reed, 3/2 per dent, 7100/2 or 14,200/1 ends of 20/22 Japan crepe, 18/4/3 edges. Filling: 68 picks of 2-thread 20/22 Japan, 55/60 turns, 2 S and 2 Z.




Weave
Chain
2 crepe
2 BOS
2 crepe
2 BOS
2 crepe
2 BOS
Drawing-in Draft
2 times
2 times
6
7
14
13
Weave Draft
1st Pick
9
15
12
16
Weave
Chain
Drawing-in Draft




17. *Sports-Weight Lisle Check Anklet.* Patterns of this type—in this case, black and gold vertical and horizontal lines forming a bold, colorful check on white ground—are available in full-length socks as well as in anklets to meet the continuing men's-wear demand for checks and plaids. The elastic top on the hose shown is particularly neat and attractive. Retails 50c.

18. *Figured and Striped Half Hose.* A combination of simple wrap-stripe dark-brown figures and brown-and-white-blended horizontal stripes on an all-white silk background. For next summer.

19. *"Paddock Check" Half Hose.* A number derived from the brilliant-color check motif so common in the saddle blankets, riding breeches, and various other riding accoutrements of the English hunt clubs. Recommended for active or spectator sports. Well suited for wear with solid-color flannels of white, biscuit, or blue gray, with white buck shoes completing the ensemble. Knit in a variety of colors, plated, on 180-needle, Scott & Williams machines from ingrain combed cotton. Retails at 35c.

20. *Silk and Lisle Half Hose.* A white and dark-blue check effect on a blue-and-white-mixture ground. A pattern of this character is sufficiently vivid and colorful to appeal to the younger men, while not being so extreme as to offend the tastes of the older men. Retails at 50c.

21. *Knitted Ribbon-Stripe Crinkle Cloth.* A dress fabric unique in that the flat stripes are perfectly smooth—a real accomplishment in this type of knit goods. Knit of 150-den. rayon on a 12-feed, 28-cut, circular, individually operated spring-needle machine.

22. *Knit Millinery Fabric of Rayon and Film.* Knit 8 ends of 150-den. rayon and 4 ends of slit cellulose film (such as Cellophane), the latter .01″ in width, on a 12-feed, circular, individually operated spring-needle machine. Film shows only on face, leaving back of fabric smooth.

23. *Men's Polo-Shirt Warp-Knit Fabric.* Knit double width on 28-gage, 180″ tricot machine. Finished down to 2 widths of 60″ each. Dark-colored yarn is 100-den. rayon; light-colored is 100-den. acetate. Cross dyed. For high style.

24. *Tricot Summer Dress Fabric.* Knit double width on 28-gage, 144″ machine. Finished down to 2 widths of 52″ each. White yarn is 75-den. acetate; colored yarn (green in fabric shown) is 75-den. rayon. Cross dyed.

**POPULAR SHANTUNG TYPES** are these four fabrics of Eastman acetate yarn in simple, ribbed, and relief weaves with spun silk and spun rayon slub filling. Construction details for these and many other novel fabrics for spring are available through the fabric development service of the A. M. Tenney Associates, 171 Madison Avenue, New York City. Sales representatives for Tennessee Eastman Corporation, subsidiary of the Eastman Kodak Company.

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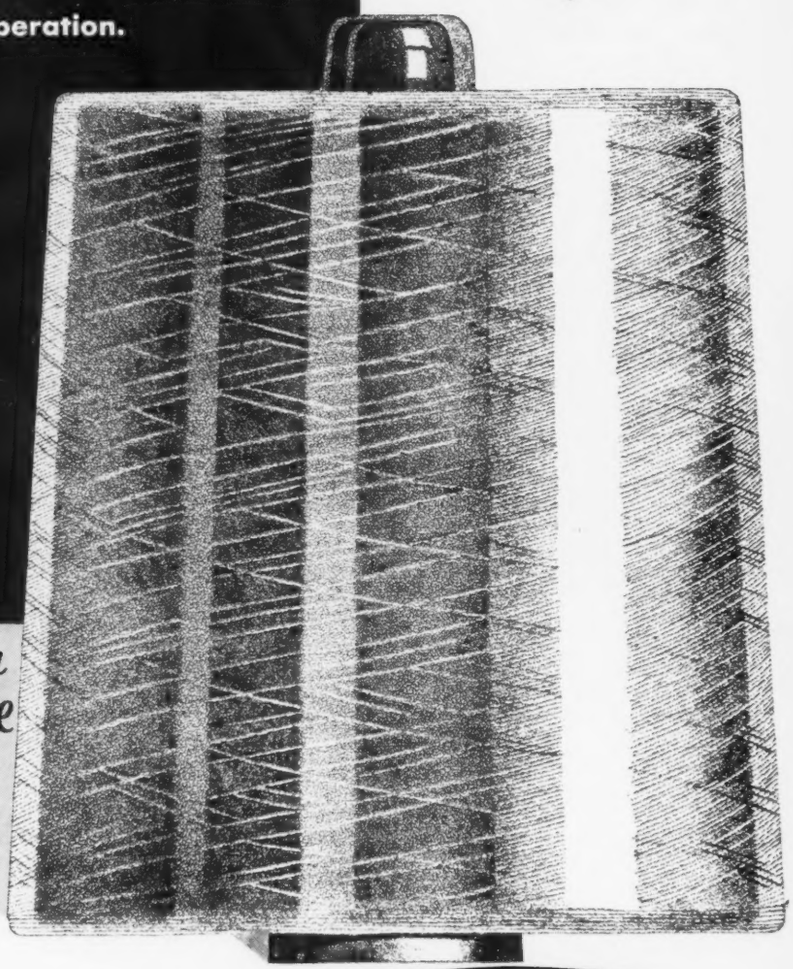
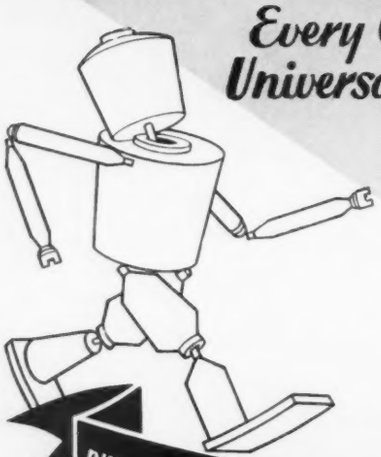


Every Cone a Universal Cone



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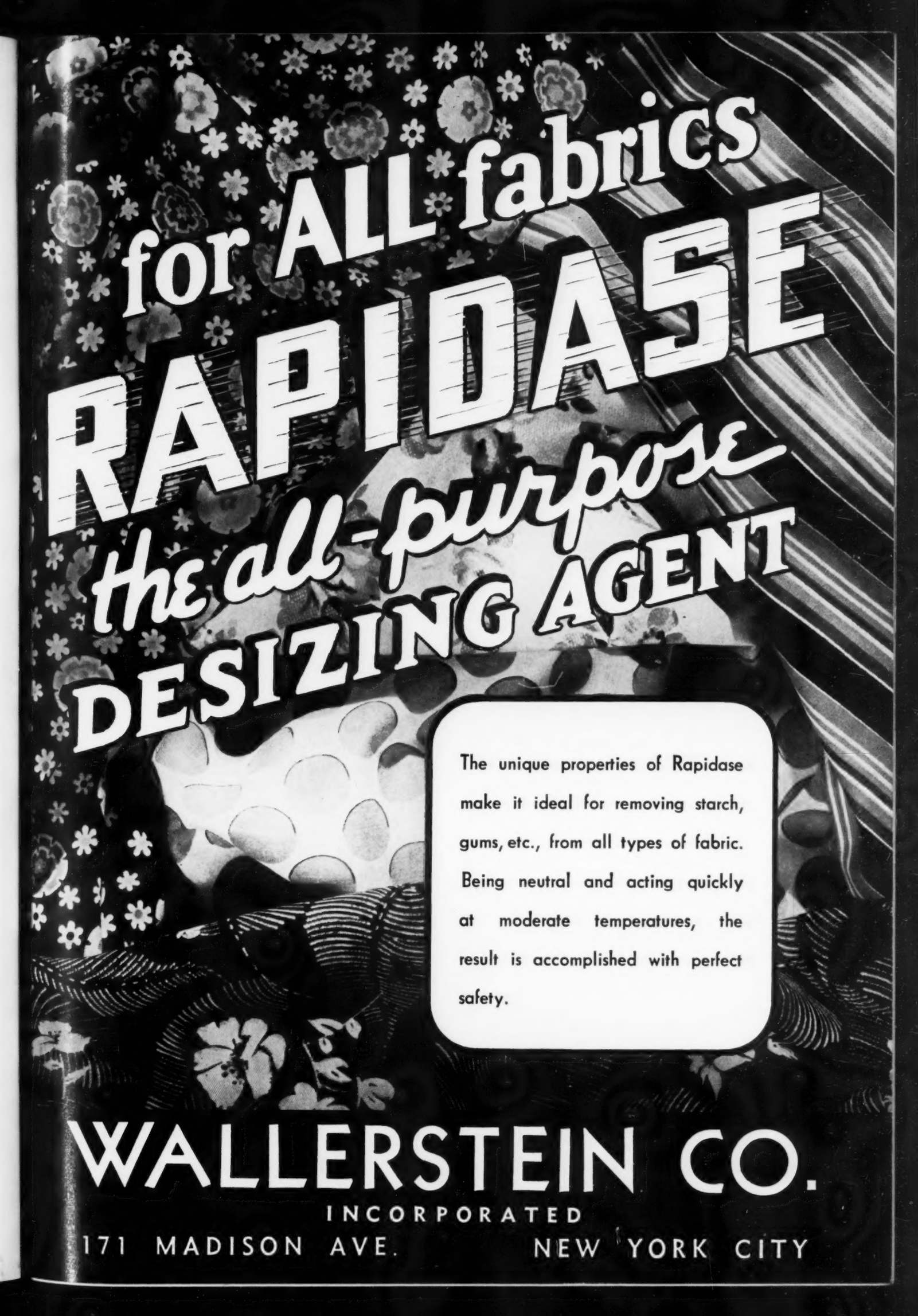
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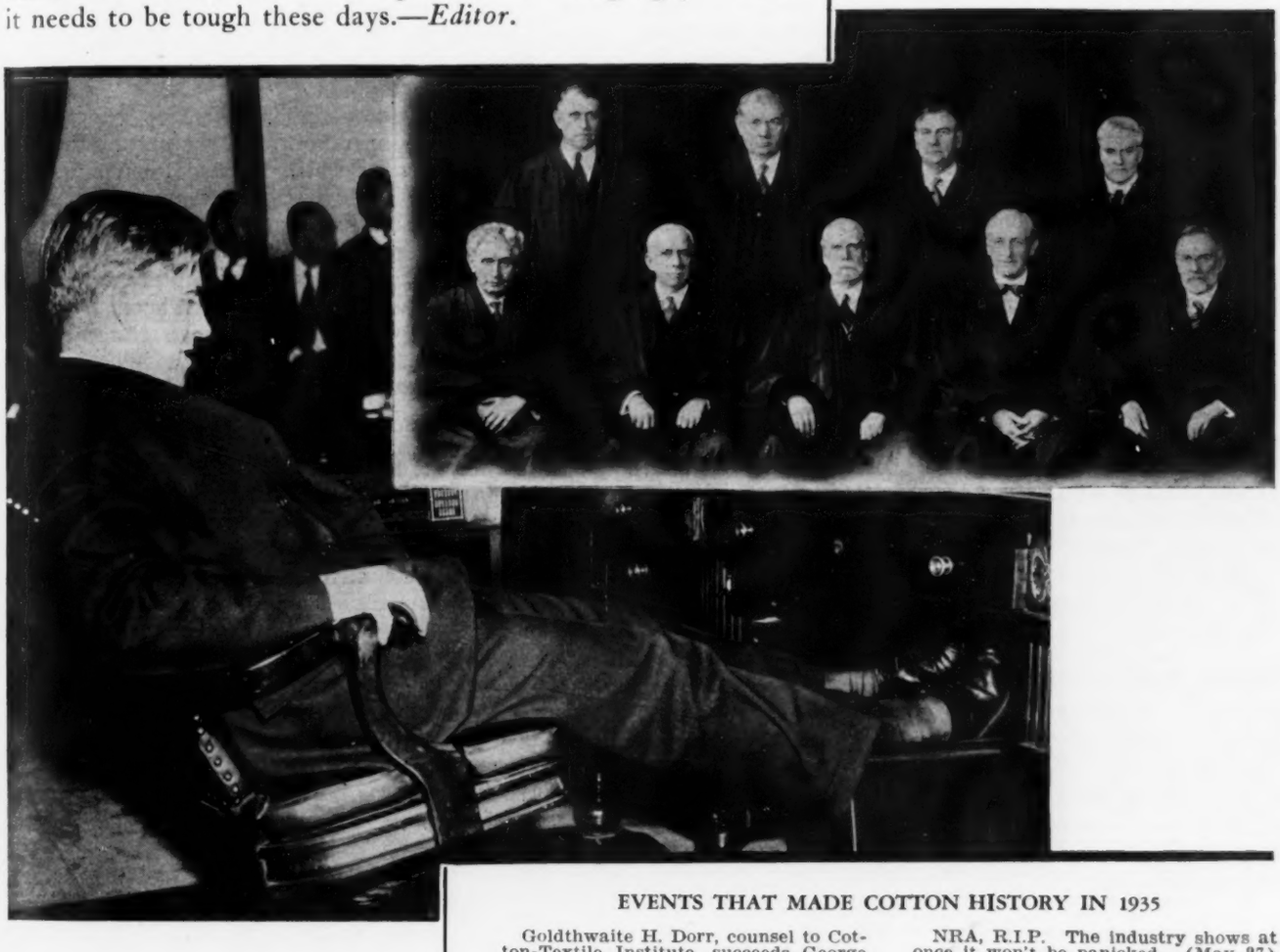
# COTTON SECTION



BEDEVILED BY PROCESSING TAXES, confused by uncertainties resulting from the sudden death of NRA, bombarded by Japanese imports, investigated by committees, and generally battered and belabored in 1935, the cotton textile industry refused to cry quits. On the contrary, the harder the blows came the more the industry stood up to them.

By the end of the year, thanks to its courage, it had made a remarkable come-back. It had had a flash of price sanity (even if of rather short duration); it had met a sharp increase in demand for its products; and it even saw its way clear to making a dollar or two.

With 1936 came the AAA execution and the package of assorted headaches accompanying it. But these too will pass. The stamina shown by the industry in the face of last year's attack has earned for it the reputation of "tough guy." And it needs to be tough these days.—*Editor.*



### EVENTS THAT MADE COTTON HISTORY IN 1935

Goldthwaite H. Dorr, counsel to Cotton-Textile Institute, succeeds George A. Sloan temporarily as president. (Jan. 1)

B. B. & R. Knight Corp., submits plan for liquidation to stockholders. (Jan.) (Plan approved and all mills except finishing plant at Pontiac closed and machinery later disposed of.)

George A. Sloan announces formation of George A. Sloan & Co., Inc., starting off as exclusive selling agents for Amoskeag Mfg. Co. and Suncook Mills. (March 8)

Raw cotton has mysterious and spectacular break, with losses up to 187 points. (March 11)

Cotton "crisis" becomes front-page news. Most of the shouting directed at processing tax and Japanese competition. (April)

Fighting spirit evidenced at meeting of American Cotton Manufacturers Association in Augusta, Ga. (April 25-26).

Southern Textile Exposition at Greenville well attended. (April 8-13)

National Cotton Week goes over with a bang as more than 30,000 retailers take part. (May 6-11)

NRA, R.I.P. The industry shows at once it won't be panicked. (May 27)

Joyous shouts are heard as U. S. Court of Appeals, Boston, declares processing tax unconstitutional in case of Hoosac Mills Corp. (July 16) (Everyone knows what happened on Jan. 6, 1936.)

Cabinet Committee issues report that is late and futile. (Aug.)

Reduction of cotton loan basis to farmers from 12c. to 10c. per lb. is one of few moves made by AAA that meets with general approval. (Aug.)

Frank I. Neild, elected president of National Association of Cotton Manufacturers. (Oct. 17)

Dr. Claudius T. Murchison, head of Bureau of Foreign and Domestic Commerce for a year and a half, elected president of Cotton-Textile Institute, succeeding Goldthwaite H. Dorr. (Oct.)

Committee on Amoskeag situation (plant closed since Sept.) stresses need for cooperation between investors, management, workers, and townspeople. (Nov.) (Petition to reorganize under Section 77-B of Bankruptcy Act filed on Dec. 24.)

# SMOOTHER SAILING

## *Experienced by cotton mills despite slow start and uncertainties*

FROM the standpoint of operation and activity, the cotton textile industry experienced much smoother sailing during 1935 than during the previous year —despite the many disconcerting uncertainties accompanying invalidation of NRA, processing tax squabbles, passage of the Wagner act, National Textile Labor Relations Board hearings, and the pending AAA decision. In fact, the last half of the year was considered good in many quarters.

Monthly cotton consumption in U. S. averaged better than 470,000 bales, nearly 4% more than the previous year. During the greater part of the year, consumption hovered between 400,000 and 500,000 bales. High months were October with 552,000 bales and January with 551,000 bales. Low months came during the summer, with June and July accounting for 384,000 and 391,000 bales, respectively. Over 5,641,000 bales utilized by domestic mills, plus 5,852,000 bales exported, brought the total of American cotton going into consumption to about 11,500,000 bales. Incidentally, it is interesting to note that despite the high price of American cotton, as compared with other growths, the monthly average export was about 487,600 bales, as compared with 484,800 bales for 1934, about 0.6% greater, with particular activity toward the end of the year. November recorded shipment overseas of 1,135,000 bales.

Prices, based on behavior of New York spot cotton during the year, fluctuated in the narrow range of 2.25c., from the high of 12.90 to low of 10.65. The high was touched in January and the low in three different months —March, August and September. The relative steadiness of the market is demonstrated by the fact that in four months the spread between the high and low recorded by spots was only 0.35c., in only five months did the spread exceed 1.00c. and the average monthly range was 0.82c. The cotton crop grown in 1935 is estimated at 10,734,000 bales, which compares with 9,472,022 for 1934, 12,664,019 bales for 1933 and a high of 17,755,000 (1926) and a low of 7,977,000 (1921) taking into consideration the last 30 years.

Spindle activity by months, closely corresponding to fluctuations in cotton consumption, was at an average of 91.0% single-shift capacity, as compared with 88.5% for 1934, an increase of 2.5%. The average number of spindles active per month was 23,422,000, as compared with 25,120,000 for 1934, thus 1,698,000 or 6.8% less.

### *The Year's Profit and Loss*

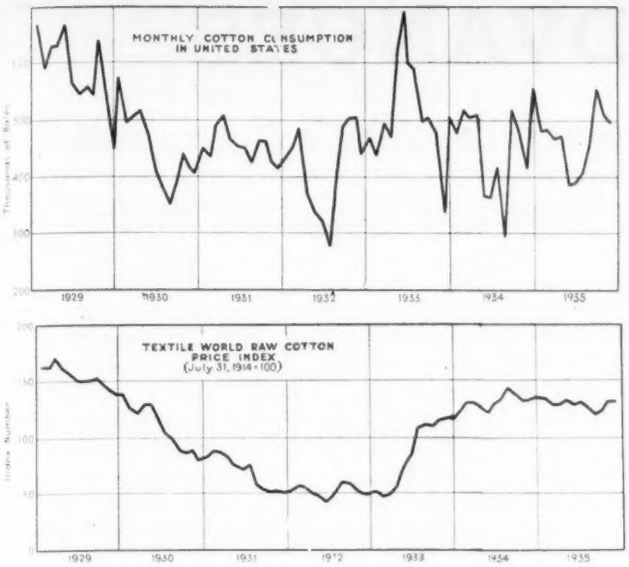
As a class the cotton textile mills may have broken even on the year's operations. However, nearly every mill lost money the first half. Some did better the third quarter, and a few made enough money the last quarter to cover earlier losses. For example, several large groups (with fiscal years ending last summer) selected at random in both New England and the South, reported losses ranging from $250,000 to $500,000; whereas, the previous year profits were reported ranging from $350,000 to $1,500,000. Despite this situation, a number of firms reported profits, even including the first half of the year, one concern reporting a net of $772,919 for the year ended July 31, 1935, compared with profit of $1,171,530 for the previous year. Few mills have made reports embracing the last half of the year as yet, but it is certain that a large number showed profit, as evidenced by dividends paid during the third and last quarters, in some instances, the first in five years. Along with this improvement, was more activity in textile securities.

"When it comes to merchandising, we have shown our

## *Cotton and Cotton Textile Prices and Activity*

| PRICES<br>Textile World Index Numbers:<br>July 31, 1914 = 100 | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | 1935 Monthly Average | 1934 Monthly Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cotton | 135 | 134 | 127 | 127 | 132 | 128 | 131 | 125 | 120 | 123 | 130 | 130 | 128.5 | 132 |
| Yarns | 138 | 138 | 136 | 135 | 137 | 138 | 140 | 139 | 135 | 140 | 145 | 146 | 139 | 142 |
| Gray Goods | 137 | 136 | 134 | 131 | 133 | 133 | 130 | 131 | 135 | 135 | 138 | 138 | 134 | 139 |
| Colored Goods | 140 | 140 | 139 | 138 | 139 | 139 | 139 | 139 | 139 | 140 | 145 | 145 | 140 | 141 |
| KEY QUOTATIONS: | | | | | | | | | | | | | | |
| Spot Cotton (N. Y.) | 12.85 | 12.55 | 12.60 | 11.30 | 12.15 | 11.55 | 12.15 | 12.00 | 10.65 | 11.05 | 11.40 | 12.15 | 11.87 | 12.28 |
| 10s Frame Spun Carded Yarn | 27½c | 27½c | 28c | 26½c | 27½c | 26½c | 27½c | 28c | 27c | 27½c | 28½c | 29½c | 27½c | 28c |
| 10/2 Carded Skeins | 27½ | 27½ | 28 | 26½ | 27½ | 26½ | 27½ | 28 | 27 | 27½ | 28½ | 30 | 27½ | 28 |
| 20/2 Carded Warps | 30½ | 30½ | 31 | 29½ | 30½ | 29 | 30½ | 31 | 30 | 30½ | 31½ | 33 | 30½ | 31½ |
| 60/2 Combed Peeler Warps | 58 | 57 | 57½ | 56 | 56 | 54 | 56 | 56 | 55 | 57 | 58½ | 60 | 56¾ | 59 |
| 60/2 Mercerized Cones | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 72 | 72 | 70½ | 72 |
| 37-in. 3-yd. Drill | 9½ | 9½ | 9½ | 9¼ | 9¼ | 9 | 9 | 8⅝ | 9 | 9¼ | 9¼–⅜ | 9¼–½ | 9⅜ | 9¼ |
| 38½-in. 64x60, 5.35 Print Cloth | 6¾ | 6½ | 6⅝ | 6¼ | 6¼ | 6¼ | 6 | 5⅞ | 6½ | 6½ | 6⅝ | 6⅝–¼ | 6¼ | 6½ |
| 36-in. 4-yd. 56x60, Sheeting | 7⅛ | 7⅛ | 7½ | 7½ | 7½ | 7½ | 7½ | 7¼ | 7¼ | 7¼ | 8¼ | 8¼ | 7⅞ | 7⅞ |
| Denims, 2.20 | 15 | 15 | 14¾ | 13½ | 14½ | 14½ | 14½ | 14 | 15 | 15 | 15½ | 15½ | 14¾ | 15½ |

| ACTIVITY | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | 1935 Monthly Average | 1934 Monthly Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cotton Consumption (Thousands Running Bales) | 551 | 480 | 482 | 468 | 470 | 384 | 391 | 408 | 449 | 552 | 508 | 498 | 470 | 451 |
| Cotton Exported (Thousands Bales Exclusive of Linters) | 466 | 390 | 318 | 323 | 278 | 345 | 280 | 241 | 487 | 712 | 1,135 | 877 | 487.6 | 484.6 |
| Spindle Activity | | | | | | | | | | | | | | |
| Active Spindles (Thousands) | 25,155 | 24,917 | 24,574 | 23,854 | 23,041 | 22,704 | 22,312 | 22,047 | 22,684 | 23,193 | 23,194 | 23,391 | 23,422 | 25,120 |
| Active Spindle Hours (Millions) | 7,542 | 6,567 | 6,623 | 6,055 | 6,087 | 5,102 | 5,155 | 5,545 | 6,184 | 7,445 | 6,897 | 6,804 | 6,334 | 5,804 |
| Average Hours per Spindle in Place | 245 | 213 | 215 | 197 | 199 | 168 | 171 | 185 | 207 | 251 | 233 | 233 | 239 | 203.7 |
| Percent of Single Shift Capacity | 102.6% | 100.2% | 92.9% | 85.3% | 83.3% | 75.0% | 73.5% | 76.4% | 93.9% | 103.8% | 101.1% | 103.8% | 91.0% | 88.5% |




greatest weakness, and it is there we should concentrate our attention!" declared W. D. Anderson, retiring president of the American Cotton Manufacturers Association, as he opened the merchandising symposium at the annual convention held last spring at Augusta, Ga. And Mr. Anderson's good advice was heeded, as evidenced by increased interest in merchandising problems.

The Augusta meeting was closely followed by National Cotton Week, in which more than 30,000 retail stores took part. Over 250,000 official posters were distributed, and over $2,000,000 spent in local advertising and promotions by wholesalers and retailers. In connection with National Cotton Week, the Cotton-Textile Institute did its usual good job of sponsoring selling helps for merchants, holding style shows, pushing Paris styles in cottons, and developing new uses for cotton.

An outstanding potential use for cotton, which received considerable publicity during the year, is cotton fabric in road construction. Several new experimental strips of "cotton roads" were laid in various States. Strips which were laid several years ago are reported holding up better than adjacent roadway without the fabric. Similar experiments went forward in connection with construction of airport runways. Other new uses included special shellacked wall coverings, novelty yarns, hand knitting yarns, and string.

Interest in consumer paper advertising continued to grow as the effect of the depression lessened. Color and sparkle featured the layouts which appeared in many papers, including *Vogue, New Yorker, Harper's Bazaar, Esquire,* etc. The tendency to make the consumer "brand-conscious" continued to increase in popularity among the mills.

●

## *The Year Ahead in Cotton*

**By Alston H. Garside**

*Economist of the New York Cotton Exchange*

NOTWITHSTANDING the drastic curtailment of production in the United States in the last three seasons, under the Agricultural Adjustment program, and the fact that world consumption of cotton in this period has been running fully as high as the average in pre-depression years, the world cotton trade has found itself this season with an over-supply to the extent of 4,000,000 to 5,000,000 bales. Total supply for this season was 39,500,000 bales, as compared with a normal, or average, supply of about 35,000,000. The reason for this situation, obviously, is the fact that, due to the price-supporting measures applied to American cotton in the last three seasons, world cotton prices have not been allowed to recede to levels where all of the excess stocks accumulated in previous seasons would go into consumption, while, at the same time, production of cotton in foreign countries has been stimulated to a point where most of the decrease in the American crop has been offset.

The world has not fully felt the weight of the excess supply of cotton, however, because an amount even greater than the excess over normal has been and is being carried by the United States Government in the Producers' Pool and the Loan stocks. At the present writing, the total stock of spot cotton in the Producers' Pool and in the Loan holdings aggregates, roughly, 5,100,000 bales, while the Producers' Pool has potential claim on 800,000 to 900,000 more bales through holdings of futures. Total stock of all growths of cotton in the world, including the estimated unpicked portion of foreign crops, is about 25,000,000 bales. It will thus be seen that 20% or more of the world stock is subject to the control of the United States Government. The effect of the withholding from market of such a large portion of the world's supply is being shown in the wide discounts on distant deliveries, relative to nearby, in the futures markets in this country and abroad.

In the midst of this situation, the Agricultural Adjustment program has been scrapped, and the Federal Government has been forced to seek some other way of restricting production in this country, if it would continue to pursue that policy. The belief that this may result in an increase of domestic cotton acreage during the coming year, and that this, with lowered prices for the staple, may force the Government's hand in adopting a program for releasing its holdings of cotton, has brought about wide discounts on new crop deliveries. It is recognized that if production in this country should be greatly increased during the coming season, and if foreign countries should make as large a total crop as they have made in the current season, the world supply of all cottons for next season will be even more in excess of normal than it was this season, unless world consumption goes to new high.

When the Agricultural Adjustment program was brought to its sudden end by the Supreme Court, there was an inclination in some quarters to predict that this would throw the cotton trade back into the distressing situation in which it found itself in 1932, the last year of uncontrolled production. The implication of some of the statements made at that time was that the world was headed for 5c. cotton, with all the misery that that connoted. Such ideas, apparently, were based simply on statistics of present or possible future supplies of the staple, without allowance for other factors. For example, these dire predictions did not take into consideration the fact that cotton at 10c. a pound is priced far below a normal parity with prices of commodities in general, which fact would tend to restrain production and stimulate consumption; world industrial production is running 30% higher than three years ago, and, under the stimulus of great volumes of unused credits and low money rates, is tending upward; and that world commodity prices, even in terms of gold, have long since ceased their decline, and are now showing a tendency to rise. It was doubtless such factors as these which stopped the decline of prices for new crop deliveries in the futures markets when they broke through 10c. level.

# TECHNICAL ADVANCES

## *In cotton manufacture include new winders and the acceptance of long-draft roving*

ADVANCES in the art of spinning and weaving have been so marked in recent years that it is not surprising to find that there was a breathing spell in 1935 as far as long-draft developments are concerned, and that new looms represented additions to already existing "families" rather than radical departures. What really is news in these connections is the rapidity with which long-draft roving frames and superior looms have been installed by the industry. As predicted last year, mills have desired to secure as great savings as possible from relatively small capital expenditures, and long-draft roving fits nicely into this picture, since the number of spindles involved is comparatively low. It is expected that fine-yarn mills will be particularly interested in installing long-draft roving during the coming year, due to the fact that frames suitable for such work, which were first announced in 1934, have been further developed.

Particularly in winding and variable-speed spinning, important advances were made in 1935, and these developments will be described in due course.

### *Determining Cotton Maturity*

Starting our trip through the mill, we find that the use of the polarizing microscope for determining the maturity of cotton has become increasingly popular. One school of thought holds that the educated fingers of the cotton classer can examine a larger number of individual fibers, but even here it is admitted that the microscope serves as a good check.

"Slickness" is one of the faults of garnetted cotton, and a new mechanical system for its elimination has been designed. A treating fluid is measured positively and applied to the stock on a predetermined basis of so many ounces of fluid to so many pounds of stock. The conditioner can be attached to any garnetting or shredding machine.

Stepping into the card room, we find a new grinder with a solid, vitrified wheel designed to lessen internal wear and eliminate possible damage to the card wire. Further, a portable, automatic-feed, needle-point grinder, with slow cylinder driving motion, manufactured in England, is now available in this country. The presser of a roving flyer exerts a gradually diminishing pressure during the winding of the bobbin, and a new shape of bottom cone for roving frames has been devised with the object of producing an even tension by allowing for this difference in pressure.

### *Progress in Spinning*

A conservative estimate places the number of spinning spindles now on long draft at 25% of the total.

Variable-speed spinning has been receiving considerable attention; and improvements have been made in the original mechanical type to make the drive more compact and easier to change, and to give it greater range. Particularly where large rings are used, end breakage occurs frequently near the end of the doff; and the new drive automatically slows the speed toward the end of the doff as well as at the beginning. Increased power consumption is one of the difficulties of variable-speed spinning and twisting; but, despite this, one mill reports an increase in production averaging 17 to 18% in spinning 9s to 30s yarn, and finds that the new drive will pay for itself in two years. Similar production increases have been reported by other mills in previous years.

Several other variable-speed spinning-frame drives were announced during the year, including one employing a slip-ring motor and rheostat controlled by the ring rail, but data on their performances are not yet available.

There have been a number of auxiliary products and improvements for the spinning room. A new seamless cork cot and a pneumatic machine for assembling long seamless cots have been developed, as well as a new roll covering of processed wood-cellulose. In the line of lubrication, a system has been devised for greasing all the bearings on the header block of a spinning or twisting frame at one time. One new spinning frame drive makes use of the reaction torque of the motor to change belt tension automatically to match changing load conditions. Improvements in another short-center drive include a base that is adaptable to reversing motors and a high shelf to permit easy cleaning. Bobbin-strippers may be made more effective by attaching a bobbin elevator that catches the clean bobbins as they are discharged and raises them to the level of any regulation roving box. Other new equipment for spinning and twisting frames includes a tension pulley with a bearing protected from dirt so that tension will be more uniform; a new hook and lever arrangement for weighting spinning-frame top rolls; and a twister bobbin with laminated fiber-base heads.

### *Winding, Warping, and Slashing*

Going on to the winding room, we find one corner which avoids an increase in pressure as the weight of the cone builds up by means of cone arms pivoted below and a new location of the cone away from top center of the roll. Another high-speed cone of the rotary-guide type employs a conical driving roll and a special yarn guide to prevent slipping and chafing at the small end of the package. The circulating-spindle type of winder has been further refined by the addition of an automatic knot-tying device that increases its production from 660 to 900 bobbins an hour.

A stop motion has been developed for warpers that changes indicating lights from green to red and stops the machine promptly in the event of end breakage. A narrow-fabric warper, capable of a speed of 300 yd. per minute, is equipped with six drums, a magazine cone creel of 360 ends with eyeboard stop motion, and motors with magnetic brakes. In slashing the most important development has been the designing of machines that have a sufficient drying

surface so that a speed of 80 yd. per min. is possible when a stretch-control device is applied.

### *Weaving Developments*

Two additions have been made to the "family" of single-shuttle looms. One is designed for wide sheetings and is built in widths from 72 to 110 in. A typical performance is a 90-in. loom running at 124 picks per min. The other addition to the line is suited to the weaving of fancies in fine cottons and rayons and has a 25-harness, high-speed dobby. This loom will run at 172 picks per min. on a 20-harness pattern, 76x72, 40s cotton warp and 50s cotton filling.

The first radical change in the principle of bobbin-changing on automatic looms made its appearance last year in the form of a threaded tension that is placed in the magazine along with the bobbin, both the bobbin and the tension being forced into the shuttle at the change of filling. The purpose of the device is to solve misthreading and tension problems.

A heavier loom, designed for the production of cotton upholstery fabrics, has been added to the box-loom series. The new model has a shuttle $8\frac{3}{4}$x$1\frac{3}{8}$ in., a warp beam 24 in. in diameter that gives a 50% increase in yardage over the old model, and a cloth roll of 22 in. that affords a gain in cloth yardage of 75%.

The popularity of Venetian blinds, with a corresponding call for ladder tape, has led one manufacturer to build a ladder-tape loom equipped with 24-space 4-bank batten, selective change motion and shuttle motion, 12-harness head, and chain carrier.

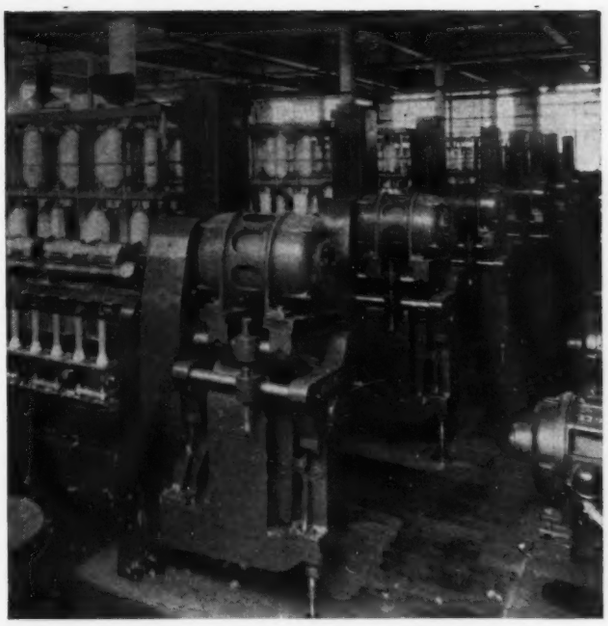
### *Auxiliary Equipment*

In the line of auxiliary equipment, there is an improved knock-off box for electrical warp-stop motions and a delayed stopping device for filling feeler motions. One new feeler motion features a renewable bronze bushing located at the main point of wear and an electrical contact through two platinum-irridium points. A pick counter has been placed on the market that has a driveshaft which is directly in the center of the counter, making the counter suitable for application on either end of the loom. An innovation in shuttle construction is seen in the use of twin grooves to aid in preventing troubles caused by unthreading, looping, or breaking of filling when it wiggles out of the shuttle eye. Another shuttle features a one-piece, cast-iron eye that eliminates all pins, brushes, and movable parts and is designed to hold the filling down in the thread groove and to prevent it from hopping out on the second pick.

Loom accessories that have been brought out include a reinforced canvas lug strap; a covering for take-up rolls which consists of a cloth backing coated with evenly graded granular particles, over which a thin film of metal covers any sharp or protruding points; new asbestos brake strapping for looms; improved reeds; and improved leather harness, lug, and bumper straps.

### *Miscellaneous Research*

A distinct high light in research progress was the publication of a report of five years of research on the mechanical properties of cotton yarns, made by H. F. Schiefer and D. H. Taft, of the National Bureau of Standards. In the main, this report, which is known as Research Paper RP 826 and is obtainable from the Superintendent of Documents, Washington, D. C., shows the effect of twist on the strength, elongation, diameter, angle of twist, and irregularity of cotton yarns. Two Bureau papers to be published later will discuss the influence of yarns of various characteristics on the properties of fabrics.



*Variable-speed spinning as installed at Austell, Ga., plant of Clark Thread Co.*

A study on methods of measuring the irregularity of cotton sliver, made at Lowell Textile Institute, was reported by R. L. Lee, Jr., who also published in "Textile Research" the continuation of his interesting "Critical Study of Cotton Manufacturing Processes."

Another potentially important step forward in research was the report made by Wanda K. Farr and Sophia H. Eckerson on their studies at Boyce Thompson Institute, Yonkers, N. Y., to determine the basic structure of cotton fibers. Cotton, they found, is not a homogeneous material, but is made up of fibrils cemented together, the fibrils, in turn, being made up of small cellulose particles, sometimes in chains and sometimes separate, but always bound together by a non-cellulosic pectic material.

A more prosaic type of research is represented by the coordinated program of the U. S. Department of Agriculture and State agencies, which has as its object the improvement of all properties of American cotton. Each year 1,792 field plantings will be made and the fiber properties and spinnability tested. Standardizing cotton production according to the one-variety community plan, with the superior varieties being used, is expected to be an important factor in providing large, even-running lots.

Among other interesting subjects on which research was reported during the year were the following: X-ray analysis of fibers, by W. A. Sisson, University of Illinois; micro-analysis of fibers, by G. Gordon Osborne, Massachusetts Institute of Technology; micro-biology of fibers, by Bryce Prindle, Massachusetts Institute of Technology; and effects of wear and laundering on cotton sheeting, by L. B. Haley, Alabama Polytechnical Institute.

Of general interest is the fact that the revised Worth Street Rules contain tolerances and deficiency limits for various classifications of fabrics, covering width, number of ends and picks, and weight of fabric.

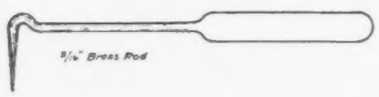
The textile committee (D-13) of the American Society for Testing Materials established fiber tests and revised tests for tire cord, hose and belt ducks, and thread.

# PRACTICAL HELPS for Cotton Overseers

A FEW SPRUNG bottom rolls, either on the fly frame or on the spinning frame, but especially on the latter, can create enough trouble in the cloth room and force enough cutting to add decidedly to the cost of production.

▼

CLEANING OF spinning-frame rolls is made easier by the device shown in the sketch. The brass hook




is used to clean off roll laps and to clean roll necks, while the flat end is used to push out accumulated waste from between the saddles and the bottom rolls.

▼

REVERSING THE order of draft on the roving frames does not hurt the spinning qualities or the breaking strength of the yarn. It may be possible to balance the machinery layout by shifting the different drafts on the roving frames.

▼

RECONDITIONING OF LICKERINS can be accomplished by first straightening the teeth with a pair of pliers and then polishing them against an ordinary burnisher. The burnisher revolves away from the points of the teeth and moves at a higher rate of speed than the lickerin.

▼

BUNCHES IN cotton yarn will be caused if the spinning operative moistens her fingers before piecing up the roving in the creel. The moistening and pinching together of the old and new roving prevents proper drafting.

▼

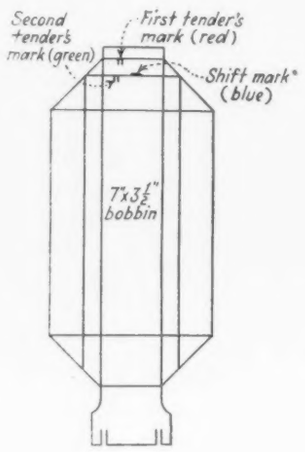
IN MAKING MOCK-TWIST yarns with single trumpets, the dark roving often twists around the light, or *vice versa,* producing off-shade filling. The remedy is to use double trumpets and to place the dark roving on the same side of the light at all times.

▼

TRANSFER BREAKS are most frequently caused by the tip of the bobbin being snapped downward in the transfer. This may be caused by the shuttle being too far up in the box. The bobbin should be transferred into the shuttle so that the tip is pointing slightly upward to allow the filling to unwind if strained.

▼

SELECTION OF a special operative to mark roving eliminates trouble due to one worker blaming another for poor results when both have handled the same bobbin. The




roving operative marks every frame in the last hour of the shift. Then, when the shifts change, a mark is made on the outermost portion of the roving. After the second tender takes over the job, a second set of marks can be made. Easily distinguished colors are used.

▼

STOCK-DYED COLORS sometimes have a tendency to wrap around the leather roll when an end comes down. The following ideas have proved helpful: adding a hygroscopic agent to the dyebath, spraying oil on the cotton at the picker, closing up the front and second roll and increasing the space between the second and back rolls, using larger top rolls, employing glazed or varnished leather cots, increasing the relative humidity of the room, and—in the case of cards and drawing frames—applying static eliminators to the machines.

▼

EXCESSIVE BALLOONING takes place in spinning when a heavy slub caused by poor roving or creeling comes through the thread guide. If the thread board is made of wood, hang a small length of wire, about ¾ in. long and shaped like a question mark, from a staple so that it swings freely and place it in such a position that, when excessive ballooning takes place, it will catch and break the end, thus preventing bad work from going on the bobbin.

▼

RESPONSIBILITY FOR stains that show up in cloth-room inspection can be placed by having the oil used in the various departments colored with a fugitive dye. For example, all oil used in the card room can be colored green, oil used in the spinning room can be colored yellow, and oil used in the weave room can be colored red.

▼

ALTHOUGH it is an axiom of weaving that the heaviest harnesses should be at the front, use of the front harnesses for the crimp when weaving seersuckers reduces the extent to which the ends have to be opened for the shed and is one method of decreasing knots caused by waste and chafing.

▼

ADDITIONAL CLEARANCE given by using a 7⅞-in. quill in an 8-in.

shuttle has decreased filling breaks on 40s yarn.

These items have been culled from the 1935 issues of TEXTILE WORLD.

# WOOL SECTION

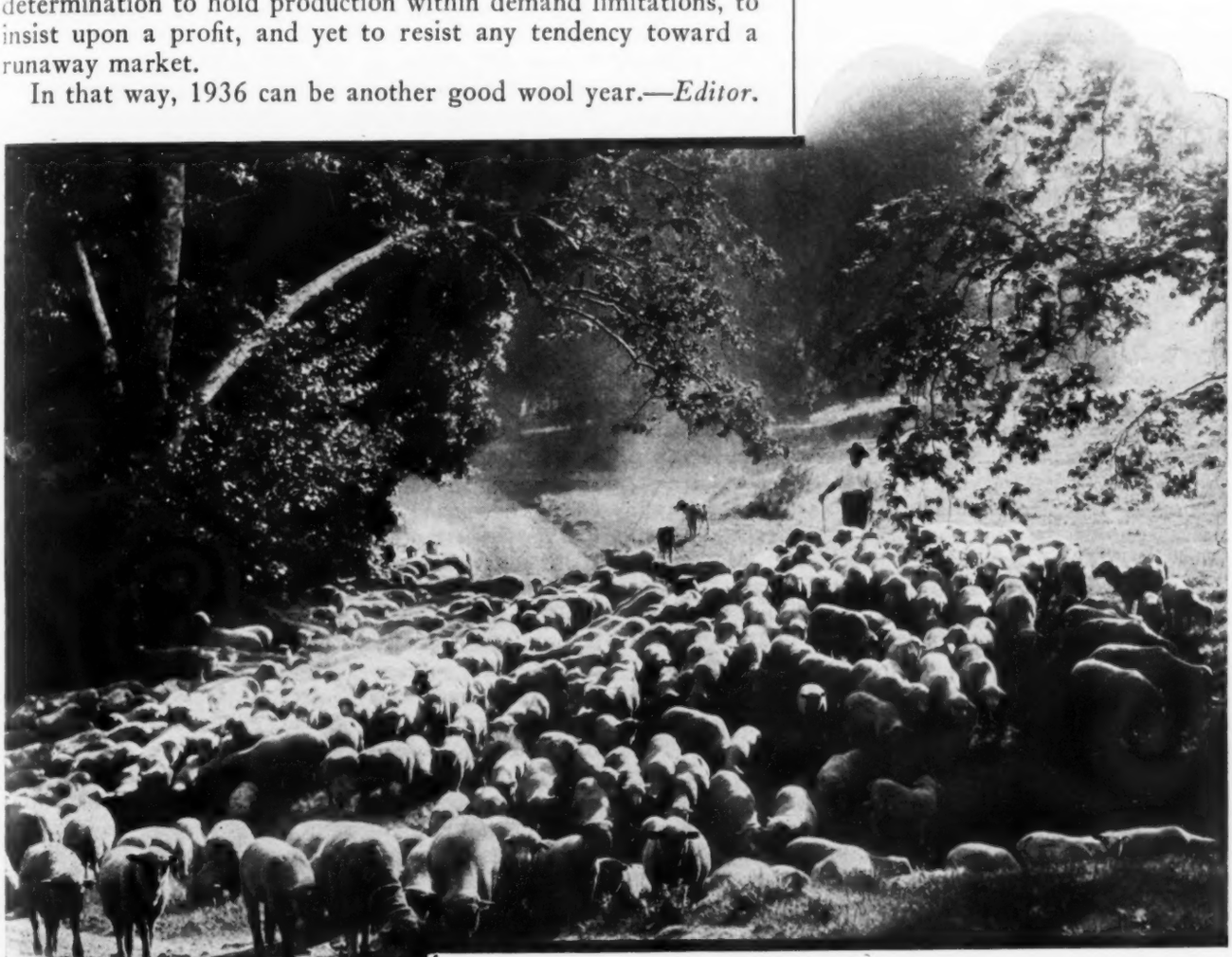


WHAT A YEAR! And what Graham McNamee could do with it over the radio! We can hear him sputtering now—trying to explain to his hearers this unprecedented come-back of the woolen and worsted industry.

It is made all the more dramatic by the fact that many people thought that that industry never was coming back again!

The main job in 1936 is to hold those gains. We do not mean that the industry should expect necessarily the same volume of business as in 1935—but it should carry over into this year a determination to hold production within demand limitations, to insist upon a profit, and yet to resist any tendency toward a runaway market.

In that way, 1936 can be another good wool year.—*Editor.*



## EVENTS THAT MADE WOOL HISTORY IN 1935

Wool promotion campaign gets closer to actuality in report by joint committee. (Jan.) (Associated Wool Industries, cooperative agency, set up in February and gets to work)

J. P. Stevens interests purchase plant of Hamilton Woolen Co., Southbridge, Mass. (Feb. 12)

Retention of the 80-hour limitation on productive equipment marks annual meeting of National Association of Wool Manufacturers. (Feb. 20)

Annual report of American Woolen Co. shows loss of $5,458,495 for 1934, compared with profit of $7,053,088 in 1933 and loss of $7,269,822 in 1932. (Feb. 15)

Ernest C. Morse selected to head wool promotion campaign of Associated Wool Industries. (March)

National Association of Wool Manufacturers comes out with strong statement urging voluntary observance of code provisions shortly after NRA decision. (May)

Wool Textile Work Assignment Board reports machine assignments cannot be determined for the entire industry by formula. (May 24)

Typp (thousands of yards per pound) system of numbering woolen and worsted yarns approved by Committee D-13 of American Society for Testing Materials at meeting in Detroit. (June 24)

Sweeping injunction restraining United Textile Workers from interfering with employees secured by Cocheco Woolen Co., East Rochester, N. H., where strike had been in progress since May 27. (July 3). (Injunction still in force.)

Seven plants of Uxbridge Worsted Co. in Massachusetts and Rhode Island reopen and 3,000 return to work when U.T.W., knowing it is licked, calls off strike that started June 24. (Aug. 6)

Profit of $501,015 for first six months of year reported by American Woolen Co. (Aug.)

Trade gets shock as Japanese worsteds make appearance in New York market. (Sept.)

Boston Wool Trade Association elects George L. Anderson, of Adams & Leland, as president at annual meeting. (Nov. 19)

With raw wool on a firm basis and sufficient orders on the books to run mills three months, wool industry really feels like celebrating at the end of a banner year. (Dec.)

*Favorable factors, synchronizing in 1935,*

*bring about a* **RECORD WOOL YEAR**

PHYSICAL volume of 1935 business in wool goods surpassed all previous records and gained about 80% over 1934. The first four months of the year were just average months, but beginning with May the rate of buying and of manufacturing rose to heights experienced before in the last decade only briefly and occasionally. The first four months recorded a gradual slowing up of the wool price decline current through 1934. May marked bottom with a fairly sharp rise following. From July till October the basis was steady, but the abnormal activity of the fall started another upswing which terminated in the sharp rise in December and January, 1936.

Profits for the year have been encouraging. It is expected that all woolen and worsted mills will show net earnings for the period, since they had both large business and inventory appreciation to bolster their accounts. A number of the foresighted manufacturers made machinery installations and improvements to plant in the first half of the year which permitted them to operate more efficiently than ever before. Others, since their treasuries have been somewhat replenished, are considering modernization this year as an attractive investment. It will permit them to eke a few more profit dollars out of the 1936 business, which, according to general belief will approach that of 1935. Modernization also attracts them as a guard against possible lean years in the more distant future. While things were on the down-and-down, modernization was not possible for mills which were just hanging on; now that things are on the up-and-up, the prospect for setting the industry's house in order is very much alive.

### *Trend Still Buoyant*

There has been much ink spilled and many typewriter ribbons punctured in expressing opinions on the forthcoming year in wool goods. Boiled down to probabilities, it seems likely that the yardage sold in 1936 may not equal that of 1935, although the dollar volume of 1936 may exceed that of 1935 because of higher prices. The principal argument against a bigger production in 1936 is the fact that history shows wool constantly bobbing up and down on a two-year cycle. Since 1935 was an "up" year, 1936 must be a "down" one. General conditions, however, tend to support the market and the recession should be very small. It is difficult to see how the bonus can do anything but improve the market for clothing, though the degree of the improvement is a matter of opinion. Some believe its effect will be enough to overturn the two-year cycle in wool goods and to present the spectacle of a second consecutive year of expanding business. A few serious-minded merchants still hold the old-fashioned idea that a presidential election year is likely to be one of caution, and they expect the bonus payment to be insufficient quite to offset that caution.

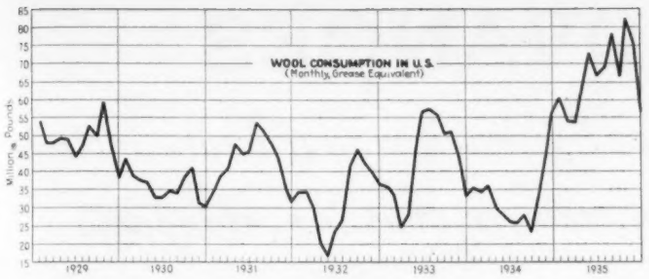
Doubtless through the coming year prices on wool goods will rise. The raw material surplus was wiped out in 1935 and there is now a shortage which only increased importation can satisfy. Whether the American public will hold its fixed price ranges by taking coarser goods or goods with larger percentages of reworked wool or substitutes in them remains to be seen. A small retail price advance may be easily achieved, but if the upturn continues, many believe, there will be enhanced demand for manipulated goods. That point has not been reached but necessary advances on fall, 1936, goods are close to the limit, clothiers indicate.

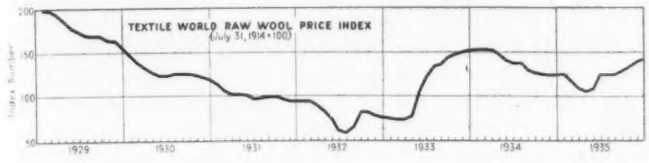
To cover the change in intrinsic values, to attract new business and to meet the style mandates of the times, manufacturers are turning to more striking patterns and colors in men's wear. Already the development is a fact in women's wear, and the greatest share of the increased women's wear business in wool goods is credited to fabrics of the sportswear type. The keynote is gaiety which may be developed is expensive, luxury lines as well as in popular-priced numbers. Women's wear has been strong for woolen lines including tweeds, while men's wear styles have favored the worsted. It seems likely these trends will continue.

A new and controllable feature brought into the wool goods market in 1935 is the promotion or "use more wool" campaign. By the end of the year this was fully

## *Wool and Wool Goods Prices and Activity in 1935*

| PRICES<br>Textile World Index Numbers<br>July 31, 1914 = 100 | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Monthly Average 1935 | Monthly Average 1934 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wool | 124 | 116 | 108 | 105 | 108 | 123 | 123 | 123 | 127 | 131 | 137 | 140 | 122 | 138 |
| Tops | 132 | 124 | 118 | 114 | 116 | 135 | 135 | 135 | 137 | 140 | 147 | 150 | 132 | 159 |
| Yarn | 154 | 152 | 148 | 148 | 150 | 155 | 155 | 155 | 156 | 162 | 167 | 170 | 156 | 167 |
| Cloth | 190 | 190 | 190 | 190 | 200 | 200 | 200 | 200 | 200 | 208 | 208 | 208 | 199 | 205 |
| KEY QUOTATIONS | | | | | | | | | | | | | | |
| Fine and Fine med. terr. wool | 72c | 72c | 63c | 62c | 60c | 67c | 69c | 67c | 68c | 68c | 68c | 76c | .68 | .77 |
| Ohio ⅜s | 28½c | 28½c | 26½c | 26½c | 25½c | 28½c | 31½c | 31½c | 32½c | 34½c | 36½c | 38½c | .31 | .34 |
| Texas 12 mo | 70½c | 70½c | 62c | 62c | 60c | 69c | 71½c | 71c | 74c | 75c | 77c | 81c | .70 | .76 |
| Tops, fine 64-66s | 91c | 91c | 89½c | 86c | 84c | 94c | 94c | 94c | 94c | 99c | $1.02 | $1.04 | .94 | 1.06 |
| Tops, average ⅜s | 76½c | 74c | 73c | 72c | 69c | 77½c | 79c | 79c | 79c | 86c | 87½c | 91c | .79 | .91 |
| Tops, high ¼ | 69c | 65c | 61c | 59c | 58c | 68c | 67½c | 70c | 70c | 78½c | 81c | 84c | .69 | .83 |
| Noils, fine | 52c | 52c | 52c | 52c | 49c | 54c | 55c | 55c | 64c | 61c | 64c | 66½c | .56 | .54 |
| 2/40s, 60s, qual. worsted | 136¼ | 136¼ | 133¾ | 128½ | 128½ | 131¼ | 137½ | 137½ | 142½ | 145 | 145 | 148¾ | 1.38 | 1.51 |
| ACTIVITY | | | | | | | | | | | | | | |
| Consumption (thousands of lbs., clean, excluding carpet) | 22,196 | 19,328 | 23,108 | 21,818 | 25,444 | 26,585 | 23,575 | 26,592 | 28,995 | 29,564 | 27,528 | 27,730 | 25,205 | 11,132 |
| Carpetwool consumption (thousands of lb., greasy) | 8,032 | 5,980 | 10,751 | 12,560 | 10,606 | 10,245 | 11,329 | 9,324 | 9,475 | 8,129 | 7,364 | 7,440 | 9,270 | 6,895 |
| Machinery (% of capacity) | | | | | | | | | | | | | | |
| Combs | 123.8 | 110.8 | 118.1 | 137.4 | 143.9 | 142.3 | 127.7 | 137.8 | 139.9 | 153.6 | 155.5 | 132.1 | 135.2 | 69.5 |
| Carpet looms | 45.7 | 56.9 | 65.2 | 73.6 | 77.1 | 62.9 | 66.2 | 76.1 | 65.9 | 68.0 | 66.5 | 55.3 | 64.9 | 45.1 |
| Wide looms | 102.2 | 111.4 | 103.4 | 91.4 | 95.2 | 97.3 | 97.9 | 107.5 | 98.7 | 105.8 | 111.6 | 113.7 | 103.0 | 69.5 |
| Woolen spindles | 109.6 | 117.8 | 103.6 | 97.5 | 106.2 | 114.3 | 120.7 | 132.5 | 124.3 | 135.9 | 133.8 | 120.3 | 118.0 | 80.3 |
| Worsted spindles | 97.7 | 88.4 | 75.7 | 78.4 | 88.2 | 89.7 | 83.4 | 83.1 | 83.1 | 100.7 | 103.8 | 90.0 | 88.5 | 48.6 |




functioning, but as it did not get under way until late spring, it cannot be credited with being more than an accessory to the generally successful year experienced by the trade. Market leaders, however, recognize the movement as a vital necessity in the current period of inter-fiber competition and they believe it will pay dividends to its supporters many times over during this and coming years. The movement had been several years in getting under way. Finally in January, 1935, wool growers agreed to cooperate and in February the Associated Wool Industries, Inc., was set up under control of growers, dealers and manufacturers, to carry on promotion by education, publicity, etc.

Synchronizing with the start of wool promotion and the end of a 12-month decline in wool prices came the outlawing of the NRA and its code system of industry coordination. Arthur Besse, president of the National Association of Wool Manufacturers, was second to none in this emergency, in promptness in urging maintenance in the industry of code provisions on hours and labor. Shortly thereafter the industry, working through the personnel of the former Code Authority, promulgated a set of business rules, similar to those current under NRA but omitting the detail of filing prices. These were to go into effect for the industry when signed by 75% of the total machinery and were then to be filed with the Federal Trade Commission. In September these rules were being adhered to by 330 mills representing 77% of total machinery and many others were following them with minor divergences.

The fall of NRA brought an attack by buyers upon the shorter selling terms adopted by the industry under its NRA Code and since then generally maintained. Women's wear had standardized on 1% 10 days, net 60, which was in contrast with the old irregularity of discounts running up to 10% and with 60 days extra time tacked on. The industry held together well, with only few exceptions, in the maintenance of its uniform terms. Men's wear found opposition to the f.o.b. mill pricing but overcame it.

## *Sellers Gaining Backbone*

In pricing their product, manufacturers showed more backbone through 1935 than usual. In February fall lines were opened at about a 5% advance over the spring opening level and about on par with the then current figures and sold well. Spring trade was brisk and clothiers accepted late deliveries without effort to cancel. In April, fall women's-wear lines were launched. They hit a rising market, for just after mid-May, with wools up 15%, advances of 5 to 10c. per yard were made in men's wear. In September under pressure of the best business in years, prices rose 2½ to 5c. and again in October 5 to 10c. was added to that. Spring lines opened at 20 to 25c. per yard over the previous spring opening. In November the market was nervous under pressure of rumors—merchants were distrustful of prosperity. In December, however, the upturn continued with mackinaws opened for fall at advances of 15 to 20%.

The percentage of operation of wide looms in the industry based on single 40-hour shift capacity as reported by the Dept. of Commerce, showed a relatively steady activity through the year. The monthly reports showed a swing from 91.4% to 113.7%, the former in April, the latter in December. Activity of woolen spindles swung from 97.5% in April to 135.9% in October.

Several unnecessary strikes were called during the year in wool mills. These were futile so far as the workers were concerned and expensive so far as the mills were concerned. That at Uxbridge Worsted Co. in July which involved 3,000 workers in the company's seven mills was ended without advantage to either side after a six weeks' shutdown.

Two New England wool goods mills reached southward in 1935 and set up branch plants for themselves in Dixie. Uxbridge acquired the plant of Adams-Swirles Cotton Mills, at Macon, Ga., and the Killingly Worsted Co., Danielson, Conn., bought the former Adell Yarn Mills plant at Stony Point, N. C.

A new competitor entered the field last summer, when several houses offered Japanese worsteds. These were priced from $2.00 per yard upward, and in quality and styling competed more with the imported English lines than with the domestic product. They will not be heard of much after they leave first hands for it is doubtful whether any clothier would stress Japanese worsteds to the consumer.

The carpet industry had a good year which was perhaps 50% in volume ahead of 1934. Carpet wools scored sharp advances and several grades became difficult to obtain. There had been, however, considerable buying ahead of the rise and its full effects may not be felt until this year. Carpet manufacturers launched a promotional campaign last fall which has several novel features.

## *Raw Wool Prices on Up-and-Up*

As previously stated raw wool prices fluctuated within a relatively narrow range in the first four months of 1935, with a moderate downward tendency, reaching their low point near the end of April. In the remaining eight months, they advanced steadily, except for a temporary setback following the NRA decision at the end of May and a slight recession during the latter part of November and early in December. The nearby future delivery on the New York Wool Top Exchange opened the year at 78.0c., touched a low point of 72.0c. at the end of April, and closed the year at about 96.8c. The average price of ten grades of wool, clean, landed Boston, was about 68.1c. at the beginning of the year, 60.9c. at the low point early in May, and 79.2c. at year-end.

The strong upward movement during the middle and latter part of the year is readily explained by statistics on consumption and available supplies. Consumption of domestic and foreign apparel wools in the United States during 1935 aggregated 705,000,000 lb. grease equivalent, compared with 383,500,000 in 1934, 572,200,000 in 1933, 439,800,000 in 1932, and 545,200,000 in 1931.

# TECHNICAL ADVANCES

## *In woolen and worsted manufacture include frosted wool, shorter drawing, standards*

THE woolen or worsted manufacturer who looks around for new ways to tune up his plant and manufacturing methods for the profits which are now very positively within his grasp—assuming, of course, he has any time to look around while filling the accumulation of orders already on hand—will find several interesting innovations demanding his attention. And on this matter of being too busy to look around, may he remember the fate of the woodchopper who was too busy to grind his axe.

From the standpoint of originality or bold departure from tradition, the most startling of 1935's innovations is the subjecting of wools to refrigeration. On a summer day just a few years ago a certain gentleman, sitting comfortably at a picnic in California, spilled some dry ice on his auto robe. The effect on the robe so astounded him that he resolved to investigate what had happened. The result was that in recent years there has been going on in Lowell, Mass., by the side of Pawtucket Falls, a series of interesting experiments. The culmination of these experiments is the recently announced Frosted Wool process, which frees wool from its vegetable impurities by freezing and dusting out the grease which holds those impurities to the fiber. This process is one of several recent innovations for which Lowell Textile Institute is responsible.

The "frosting" process is not complicated. The grease wool drops on to an apron which passes under some cooling coils in a refrigerating chamber. Still in the chamber, the wool passes through a special duster, which removes a large part of the then crystallized grease and most of the vegetable matter. Less scouring is necessary than formerly, and this means a saving in soap, alkali, steam, and water. Tops have better color, feel, and bloom. Noils are more valuable and, with few exceptions, require no carbonizing. The stock runs better in subsequent processes, and the ultimate yarns are superior. Low-priced, defective wools are made the equivalent of, or better than, free wools in content.

### *Reduction in Drawing Operations*

Another new development which, although not confined to 1935, has reached a stage where it deserves mention in this annual review is the reduction in Bradford drawing operations being undertaken by worsted mills. A year and a half ago the results of tests at Lowell Textile Institute, published at that time, showed that fewer drawing operations not only saved money, but also produced a stronger, more elastic, and evener yarn.

Experience in England bears out the desirability of the reduction from an economic standpoint and indicates that there is no loss of yarn quality, but fails to support the Lowell tests with respect to an improvement in yarn quality. There is an obvious explanation for this failure, however—the best test made at Lowell employed only six operations between combing and spinning in the manufacture of 36s yarn from ⅜s-blood re-carded waste and the first of these six operations was an intersecting gilling, whereas in England the tests have apparently not been based on such extensive reduction and the intersecting gill box has not been employed. In fact, it is said that, in general, the experiments in England go no further than is standard practice among some American mills. Is it possible that even Lowell did not arrive at the ultimate reduction in operations which could be advantageously made?

It is perhaps surprising that the elimination of steps in the drawing process has not come about as the result of new developments in machinery, rather than as the mere dropping out of machines, particularly in view of the recent attempts, mentioned in previous reviews, to make the revolving-disk method and a new tape-condenser method applicable to almost the complete elimination of worsted drawing. However, revolutionary changes do not ordinarily come over night.

### *Anglo-Continental Drawing*

Still another development which has been under way for some time deserves mention in this year's review, if only for the reason that its reputation has caused numerous inquiries regarding it in this country during recent months. We have discussed the process on previous occasions, as its various details have been developed, but never under its present name—the Anglo-Continental worsted drawing system. There is only one installation of this system in the United States.

The purpose of Anglo-Continental drawing is to permit the working of shorter wools and of tops of more uneven length than can be handled on the regular Bradford system and yet still attain sufficient smoothness and solidity of roving for spinning on Bradford machinery. The system can handle either oil-combed or dry-combed top and is in other ways more versatile than any previous system of drawing. It is said to break less fiber and produce a stronger yarn, and it is particularly efficient in blending fibers.

A single set of Anglo-Continental drawing consists of two or three intersecting gill boxes, three or four Anglo-Continental balling boxes, one Anglo-Continental cone frame, and two or three cone or open reducing and roving frames. The porcupines on the Anglo-Continental machines have metal bars lying between the longitudinal rows of pins, these bars falling on the sliver (which passes under, rather than over, the porcupine) to drive it out of the pins at the proper moment.

### *Automatic Single-Pick Loom*

At Lowell Textile Institute is now on exhibition the first practical automatic single-pick loom. The invention consists primarily of a bobbin-changing attachment which will replenish filling in three single-picking shuttles on 2x2- or 4x4-box looms; and its purpose is to conceal yarn irregularity, whether the irregularity be in color or diameter, by preventing the formation of adjacent picks from the same bobbin.

The timing of this loom is such that indication takes

*"One summer day a certain gentleman, sitting at a picnic in California, spilled some dry ice"*

effect when the shuttle with the exhausted bobbin is in the top box on the magazine side of the loom; and on a 2x2 loom, for example, the exhausted bobbin, forced downward on the Northrop principle, passes through the bottom box, which is otherwise empty, into the bobbin can. Pick-and-pick pattern work on such a loom is impossible, because it is impossible to predict definitely that the shuttles will be calling for filling in any given order and because the box under the shuttle requiring change must always be empty. Hence, the filling supply must be all the same type of yarn.

Before this brief survey of new processes and machines is brought to a conclusion, at least three more things certainly deserve mention. An engineer has developed a radically new wool-blending process which employs a hopper that first weighs each ingredient of the blend and then drops it on a conveyor. Second, the replacement of cast gears with spiral gears running in a bath of oil has permitted increasing the speed of worsted roving frames on 8x4½-in. packages from some 1,100 r.p.m. (in some cases 1,200 to 1,300 r.p.m.) up to as high as 2,000 r.p.m. Finally, a new double-purpose feeler permits convenient changing from double contact to slide slip on woolen, worsted, blanket, and some cotton looms.

The average wool manufacturer who looks around for possible ways to tune up efficiency and tune down costs cannot, however, confine himself to only those things which were new in 1935. The chances are that, if he really is an average mill owner, he has not yet adopted worsted metallic carding, intermediate broad-band woolen card feeding, tape condensing, hot-air backwasher drying, Bradford intersecting gilling, woolen ring spinning, worsted ring spinning, variable-speed spinning, high-speed jack spooling (750 yd. per minute has been attained in special instances), high-speed warping or dressing (good practice, under average conditions, permits speeds of 200 to 300 yd. per minute for worsted and 100 to 200 yd. per minute for woolen), high-speed weaving, and the numerous other, although slightly less important, improvements we have been recording faithfully year after year.

### *Catches up with Standards Parade*

As important as the advances in equipment and technique in 1935 were the new standards adopted. The wool industry was perhaps the last of the textile groups to join in the movement toward standardized and simplified practice which is sweeping through all American industry today; but in one short year it has, with courage and determination, caught up with the parade.

The guiding spirit in this effort to eliminate confusion and misunderstanding between wool dealers and mills, scourers and spinners, spinners and weavers, yarn mills and knitters, manufacturers and selling houses, and so on, is the wool section of Committee D-13, the textile committee of the American Society for Testing Materials. The following D-13 standards are now available: "Method of Estimating Hard Scoured Wool in Wool in the Grease," "Methods of Testing and Tolerances for Woolen Yarns," "Methods of Testing and Tolerances for Worsted Yarns," "Methods of Testing Pile Floor Covering," and "Methods of Test for Fineness of Wool."

The yarn standards include the adoption of the Typp system for numbering both woolen and worsted yarns, this system replacing such previous systems as the worsted (560 yd. per pound), the run (1,600 yd. per pound), the Philadelphia cut (300 yd. per pound), the Cohoes (grains per 6¼ yd.), the Amsterdam (grains per 12½ yd.), the American (grains per 20 yd.), the New Hampshire (grains per 50 yd.), etc. The term "Typp," pronounced "tip," is built up from the initials of the words composing the phrase "thousand yards per pound," which designates the unit of the system; thus a 10-typp yarn runs 10,000 yd. per pound. The typp number bears a simple decimal relation to the yards per pound, and hence the conversion of a count in any other system to the typp equivalent, or vice versa, is a simple matter. The Typp system was first proposed for use with all yarns by TEXTILE WORLD and has since been so adopted by the National Bureau of Standards.

Also included in the yarn standards is the adoption of the terms "S" and "Z" for designating the directions of twist in yarns, each letter applying to the direction of twist in which the slope of the central portion of the letter corresponds to the slope of the twist spirals when the yarn is held vertically. These terms, also originally proposed by TEXTILE WORLD, have been adopted by Committee D-13 for woolen, worsted, cotton, rayon, silk, jute, and asbestos yarns.

Work sponsored partly by the Textile Foundation is under way to standardize methods for determining the quality of tops, and an effort is being made by D-13 to have domestic wools used in the Government top standards. A scientific study of mildew and related damage has been conducted at Massachusetts Institute of Technology; and early in the year a report on methylene-blue absorption as a quantitative measure of wool damage was made by the Bureau of Home Economics, U. S. Department of Agriculture.

Following a general conference on December 16, the Division of Trade Standards, National Bureau of Standards, issued ballots on the "Recommended Commercial Standard for Wool and Part-Wool Fabrics." This proposed standard defines terms used to describe the fiber content of wool and part-wool fabrics, provides methods of test for determining the percentage by weight of the total fiber content represented by the wool fibers, and illustrates the manner by which manufacturers and distributors may guarantee compliance with the commercial standards. Balloting is also under way on the important "Recommended Commercial Standard for Woven Dress Fabrics—Testing and Reporting"; and a controversy rages as to whether wool fabrics should be exempted from the perspiration-fading tests outlined therein.

# PRACTICAL HELPS for Wool Overseers

TWITTY WORSTED yarn is frequently caused by imperfect creeling. Single-pegged creels usually have iron pegs to support the roving bobbins, and, if the small cups at the bottom of the pegs become surrounded with waste, an excessive tension is placed on the roving. The trouble can be avoided if all waste is removed from each peg whenever a new roving bobbin is placed in the creel.

▼

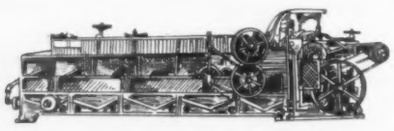
THE MOST IMPORTANT requirement of a variable-speed spinning drive is that the speed always be exactly timed with the builder mechanism. A small error in this respect may entirely counteract all of the gain and may even result in a poorer spin than if the drive were run at a constant speed. A direct drive between the builder mechanism and the speed-controlling rheostat is a decided advantage.

▼

A MILL AGENT or manager should check up his waste ends of cloth at regular intervals. If an employee wastes only $\frac{1}{8}$ yd. on each piece, it will amount to a sizeable sum by the end of the year.

▼

SCOURED WOOLS which retain a sticky handle always nep in carding. A remedy for this trouble is to employ more alkali in the early scouring bowls, give the wool a good soaping in the third bowl, and a clean rinse in the last bowl.



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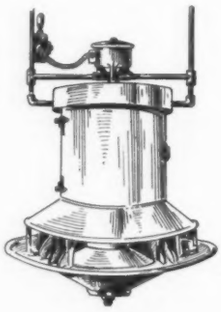
THE AMOUNT of draft imposed in worsted drawing cannot be varied excessively without bad results, but the number of doublings at each machine seems capable of considerable variation. It is possible, for example, to reduce the number of operations in a typical layout from nine to seven, by omitting the second can gill box and the second finisher, and still produce a comparable yarn.

▼

COARSE HAIRS showing on the surface of camel's-hair cloth after fulling can be eliminated by giving the pieces a run over the shear—both front and back—before napping.

▼

RELATIVE HUMIDITY of 65% in the card room will retard and regulate the evaporation of the emulsion, and will preserve an adequate moisture content in the roping. End breakage will be reduced and more uniform counts produced by having a relative humidity of 50% in the spinning room.



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BAD PIECINGS in tops can be prevented from passing forward by placing a flat eyelet, 3x$\frac{1}{4}$ in., close to the front roll of the second finisher box. Bad piecings cannot pass through the eyelet and therefore break, and operatives soon learn to avoid making them.

▼

UNKNOWN MIXES of colors in wool, merino, rayon, and mohair stock or yarn can be analyzed by careful visual inspection and dissection with burling irons under a magnifying glass. The percentage of each color in the mix can be determined by weighing the original sample carefully on grain scales, and weighing each color group when collected.

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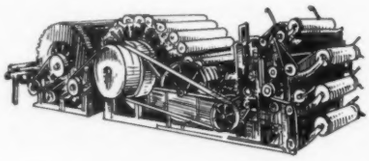
A CARD DOFFER which is not moving fast enough allows some of the material to be taken around to cause more neps at the workers. Faster doffers mean thinner slivers,



but this can be remedied by running the slivers from two cards into one can by the coiler motion.

▼

PRECAUTIONARY measures to guard against anthrax are as follows: A daily inspection of workers should be made for cuts and abrasions; all exposed employees should take a shower at the end of the day and change clothes, or the hands and arms should be washed in a 5% solution of Lysol in water; every worker should be instructed to report any sore or pimple, no matter how insignificant; a nearby hospital or physician supplied with anti-anthrax serum should be available at all times.

▼

SLUBS IN ROPING are frequently caused by the following conditions: (1) dirty cards; (2) incorrect fancy adjustment, causing rolling, fly, and wind rolls, particularly if stock is too dry; and (3) need of stripping out stock.

▼

IF TOP QUALITY be taken as 100%, it may be said that fineness of fiber, in conjunction with fiber distribution, staple length, and fiber strength, contribute 80%. Color and handle contribute the remaining 20%.

These items have been culled from the 1935 issues of TEXTILE WORLD.

# RAYON SECTION

CLOSE YOUR EYES and imagine an industrial curve which doesn't register a break for 1929 but which keeps on going up, up, up—right through 1935. Pleasant sort of a pipe-dream, isn't it? Sort of an opium-smoker's fantasy.

Well, open your eyes now and see that dream come true. Domestic rayon consumption in 1935 nearly twice that of 1929.

We wonder what hole the old skeptics on rayon have dug themselves into. We recall that they were predicting the end of the rayon boom when domestic annual production hadn't reached 50,000,000 lb. Now it's over 250,000,000.

And, believe it or not, synthetic fibers are still going places.

—*Editor.*

## EVENTS THAT MADE RAYON HISTORY IN 1935

Reorganization plans for Furness Corp., under Section 77-B legally approved, with Industrial Rayon Corp., having cross-licensing agreement with the newly-named New Process Rayon Co. (Feb. 25)

E. I. duPont de Nemours & Co. announces formation of company to manufacture viscose-process rayon in Argentina. (March 9)

Price reduction averaging 5c. per lb. brings 150-40 down to 55c. per lb. Cut in cellulose acetate and in cuprammonium averages 10c. (April 16)

Charles Whitney Dall, executive vice-president of National Rayon Weavers Association, elected president, succeeding Percival S. Howe. (June 25)

Proposal to place processing taxes on both rayon and silk by amendments to AAA. defeated in Senate by 62-15 vote. (July 20)

Ten-week strike in Industrial Rayon Corp., Cleveland. (July 31)

Viscose Co. initiates price advance by raising 150-40 2c. per lb. (Aug.)

Tubize Chatillon Corp. announced sale of nitro-cellulose plant at Hopewell, Va., to Brazilian group, Tubize retaining part interest. (July)

Membership expansion, market development, expansion of statistical service, opposition to harmful legislation, improvement of public relations, and closer contact with research departments of yarn producers adopted as a platform by National Rayon Weavers Association. (Oct. 10)

All records for attendance at meetings devoted to textile research shattered when 300 attend the open conference on rayon creping problems held by U. S. Institute for Textile Research in New York. (Nov. 14)

R. E. Henry, of Dunean Mills, elected chairman of board of National Rayon Weavers Association to succeed the late Charles Walcott. (Dec. 18)

Prices of viscose yarn, with exception of 150-40, were advanced 2 to 5c. (Dec. 19 to Dec. 30.) Price of 150-40 was advanced 5c. on Feb. 5, 1936.

# RAYON TEXTILE INDUSTRY

## *Taking 71% of yarn now assumes own identity*

ANALYSIS of the rayon industry's record during 1935 shows two phases to be outstanding, and indications are that these will become increasingly important this year. The points are: (1) a trend among manufacturers of either all-rayon fabrics or rayon mixed with silk or cotton to identify themselves as an integrated rayon textile industry; and (2) a significant change in the relationship of processes, as indicated in acetate's 47% gain.

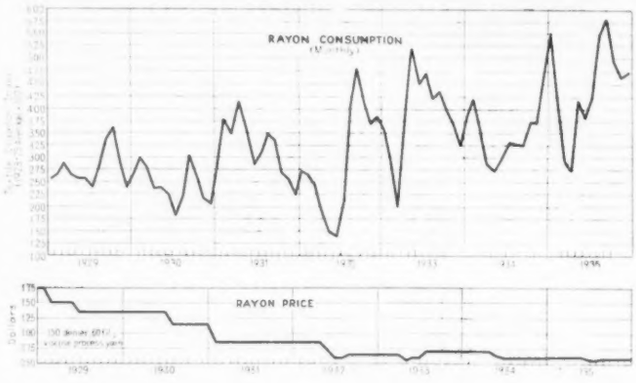
There are, of course, other important aspects too; for instance, the concerted effort by producers to hold down prices, and the increasing interest producers show in the possibilities of foreign markets. But these points are subordinate to the first two. The increase of rayon yarn consumption among weavers is clearly destined to become more pronounced as time passes.

Official statistics for 1935 currently issued by *Rayon Organon* show that weavers now represent 71% of rayon yarn consumption. To those who have watched recent trends in broadgoods manufacture this will occasion little surprise; in the narrower sense it is more or less an old story. However, when the 1935 gain is examined in the light of other developments a wider significance is disclosed.

Certainly there is a very definite relation between the present preponderance of rayon yarn used in weaving and the pending proposal to consolidate the silk wing of the rayon weavers with the cotton wing. Reduced to its essence, this trend of events, including withdrawal of certain important groups from the National Federation of Textiles, etc., has one chief meaning, namely, that rayon weaving has grown to the point where it may now consider itself a separate textile industry, and therefore it is ready to completely shake off the hybrid silk-rayon ambiguity which of late years has hindered its progress.

Scarcely less important, though from a different angle, is the changing line-up of the two chief processes. Again consulting Stanley Hunt's official figures in the *Organon*, we find that the 47% gain in acetate production last year contrasts with an 18% gain in viscose production. This represents a definitely established trend to acetate; that is manifest when we note further that between 1930 and 1935 acetate production has increased nearly 500% while viscose production has increased considerably less than 100%. The effect of such a picture is to provoke the question: what will happen if and when acetate becomes the dominant yarn in volume? Such seems remote with viscose still so far in the lead, yet it merits careful consideration. Indeed the foremost producers themselves are sensing this drift, and make due allowance for it in their expansion plans, as witness the recent announcement by the largest viscose process yarn company of a plan to increase its acetate output 100%. The present elimination of price differential between viscose and acetate yarns and the significant fact that now some acetates sell below viscose yarns shows up as a logical outgrowth of the same trend.

Rayon's price story for 1935 evidences the downward trend. Using 150 denier 40 fil. as our key number we find prices at the beginning of 1936 were 3c. below the same period of 1935. This yarn opened 1935 at 60c.; on




April 17, 1935, it was cut to 55c., where it remained until Aug. 8, 1935, when a 2c. advance was announced, bringing it to 57c., its present level. The end of 1935 brought a 5c. rise but as this did not include 150-40, its effect was limited to a small part of production. Weaving yarns held to list most of the year; knitting yarns sold below list during the second half of the year, but the recently announced 5c. advance aids profit prospects.

The wisdom of the producers' effort to pass on in lower prices such savings as they may have effected last year in production costs is confirmed in the annual production-sales total which rose 23% to 256,659,000 lb. in 1935. Then too it was recognized that while the general trend of prices was upward last year, market expansion remained a major problem for rayon, and any tendency to force prices too rapidly upward would impede the expansion job. The strong position of silk in the second half of the year helped toward rayon's 3c. regain.

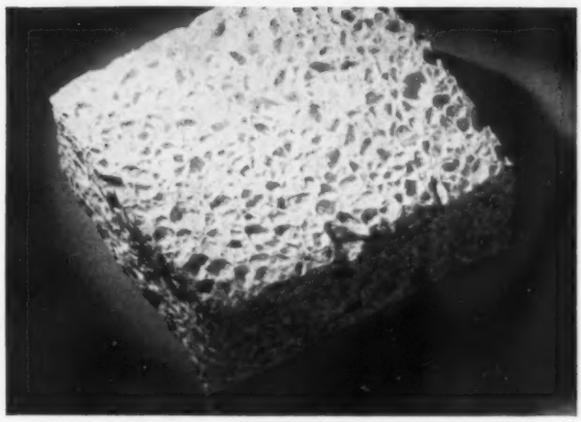
## *Trend Figures in Rayon for 1935*

| | Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | 1935 Monthly Average | 1934 Monthly Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRICES | | | | | | | | | | | | | | |
| Viscose | | | | | | | | | | | | | | |
| 75 denier (30 fils) | $0.92 | $0.92 | $0.92 | $0.92 | $0.85 | $0.85 | $0.85 | $0.87 | $0.87 | $0.87 | $0.87 | $0.87 | $0.88 | $0.94 |
| 100 denier (40 fils) | .80 | .80 | .80 | .80 | .74 | .74 | .74 | .76 | .76 | .76 | .76 | .76 | .77 | .78 |
| 150 denier (40 fils) | .60 | .60 | .60 | .60 | .60 | .55 | .55 | .57 | .57 | .57 | .57 | .57 | .58 | .58 |
| Acetate | | | | | | | | | | | | | | |
| 150 denier | .65 | .67 | .67 | .67 | .60 | .60 | .60 | .60 | .60 | .60 | .60 | .60 | .62 | .77 |
| Cuprammonium | | | | | | | | | | | | | | |
| 150 denier (112 fils) | .65 | .65 | .65 | .65 | .60 | .60 | .60 | .60 | .62 | .62 | .62 | .62 | .62 | .78 |
| ACTIVITY | | | | | | | | | | | | | | |
| Consumption Index (Rayon Organon. 100 = daily average 1923-25) unadjusted. | 553 | 441 | 295 | 274 | 417 | 381 | 433 | 550 | 583 | 494 | 464 | 473 | 446 | 348 |
| Imports, pounds (for consumption) | 578 | 305 | 327 | 8,265 | 2,929 | 130 | 2,011 | 2,114 | 569 | 4,923 | 1,184 | 2,435 | 2,148 | 6,449 |

With respect to merchandising, rayon's record was one of assiduous activity by the individual yarn companies. It is regrettable that the year 1935 brought no such cooperative effort as was manifested in the "Synthetics and Plastics Exhibition" staged by the Fashion Group in 1934. This display, the highwater mark of rayon exhibitions, was so effective as to arouse the hope among many that some such event might be staged annually by the rayon industry. Might we add that such a project is deserving of consideration for this year, and that no individual display could possibly have the weight of one in which a group of producers combined their efforts?

However, the merchandising work carried on by separate companies in 1935 was notable. The producers continued their close cooperation with the weaving and apparel trades and that resulted in increased acceptance of rayon as a quality textile. Distinctive progress in finishing helped to the same end, the year having brought forth many significant refinements in the printing of rayon fabrics. Among unsolved problems we might list the 100% viscose rayon shirting; however, technicians are still experimenting in the hope of developing such a fabric commercially. The widening market for staple is obviously of great promise. Summer suitings appear to be the most significant phase of the staple market for this year; however, developments are crystallizing in many other fields, especially sportswear, and there is little question that 1936 will witness important and surprising accomplishments in extending the use of staple fiber.

Viewing rayon merchandising broadly, it must be recognized that the synthetic yarn is no longer the *enfante terrible* of textiles, springing a new sensation each minute in the form of some surprising new use. Its merchandising effort is beginning to stabilize; at least, this is true so far as the silk and rayon textile markets are concerned where rayon's position is pretty clearly defined. The chief initiatory action taken by rayon today is expansion toward wool textile markets, and it is making significant gains in the rayon-and-wool mixtures. Obviously the standard rayons constitute no immediately serious threat to wool. Staple fiber, on the other hand, is entering various of wool's specialized markets and, due to its appearance, may find increasing use in apparel which hitherto had been very generally of all-wool.



*And now—a rayon sponge!*

Dissolution of the NRA, a vital phase of 1935 to most textile branches, proved of only minor importance to rayon yarn producers, the yarn industry being affected little by either the advent or the exit of the NRA. To the rayon weavers, however, the end of the Recovery Act brought problems which have not yet been wholly solved. The three-shift issue crystallized very quickly into a crisis and for some months after the passing of the NRA it seemed that a period of disastrous overproduction of fabrics was imminent. However, three-shift operation was adopted only by certain mills and a fairly healthy position was maintained with some fluctuations through the second half of the year. One of the difficult problems facing rayon weavers in 1935 was a tendency among themselves to apply rayon yarn to constructions for which the yarn is not suited, resulting in costly wastage of goods. Efforts now are under way to develop standards for rayon constructions which it is hoped may solve the problem.

In sum, it might be said that, for the rayon industry the year 1935 marked definite progress. Surpassing all in significance, with respect to the year now opening, is the manifest desire of the weavers to evolve what promises to be one of the great textile branches of the future —the rayon textile industry.

## *Denier and Filament Number of American Commercial Rayon Yarns*

*Courtesy Cox & Fuller, New York*

| DENIERS | 30 | 40 | 45 | 50 | 55 | 60 | 65 | 75 | 100 | 120 | 125 | 150 | 170 | 200 | 250 | 300 | 450 | 600 | 900 | 1200 | QUALITIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **I. VISCOSE PROCESS:** | | | | | | | | | | | | | | | | | | | | | |
| The Viscose Co. | .. | .. | .. | 14 | .. | .. | .. | 30 | 40 | .. | 36 | 24-40 | .. | 30-75 | .... | 44-60 | 100 | 100 | 100 | 150 | Filenza & Chalkelle, 1-2 |
| | .. | .. | .. | .. | .. | .. | .. | 45 | 60 | .. | .. | 60-100 | .. | 133 | .. | 200 | .. | .. | .. | .. | Bright & Dulesco, 1-2 |
| Du Pont Rayon Co. | .. | .. | .. | 20 | .. | .. | 26 | 12 | 20-40 | .. | 34 | 24-40 | 60 | 35 | 150 | 50 | 72 | 96 | 144 | .. | Bright, Semi-Dull & Dull, 1-2 |
| | .. | .. | .. | .. | .. | .. | .. | 30 | 60 | .. | 50 | 60-90 | .. | 80 | .. | 80 | 270 | .. | .. | .. | |
| | .. | .. | .. | .. | .. | .. | .. | 45 | 100 | .. | .. | 150 | .. | 120 | .. | 180 | .. | .. | .. | .. | |
| Industrial Rayon Corp. | .. | .. | .. | 14 | .. | .. | .. | 20 | 28-40 | .. | 34 | 40-60 | .. | 40-80 | 60 | 44-60 | 60 | .. | .. | .. | Spun Lo & Premier, 1-2 |
| American Enka Corp. | .. | .. | .. | 18 | .. | .. | .. | 45 | 40 | .. | 40 | 40-60 | .. | 40-80 | .. | .. | .. | .. | .. | .. | Bright, Perlglo & Englo, 1-2 |
| | .. | .. | .. | .. | .. | .. | .. | .. | 60 | .. | 50 | 90 | .. | 120 | .. | 60 | .. | .. | .. | .. | |
| No. American Rayon Corp. | .. | .. | .. | .. | .. | .. | .. | .. | 40-60 | .. | 42-52 | 42-60 | .. | 75 | 75 | 46-75 | .. | .. | .. | .. | Bright, Semi-Dull & Dull, 1-2 |
| | .. | .. | .. | 15 | .. | 60 | .. | 30 | 100 | .. | .. | 100-150 | .. | .. | .. | .. | .. | .. | .. | .. | |
| The Hartford Rayon Corp. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 24-40 | .. | 40-80 | .. | 44 | 66 | 66 | 126 | .. | Bright & Dull, 1-2 |
| Acme Rayon Corp. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 44 | .. | .. | .. | 44 | .. | .. | .. | .. | Bright, 1-2 |
| Delaware Rayon Corp. | .. | .. | .. | .. | .. | .. | .. | .. | 44 | .. | 44 | 24-44 | 44 | 30-60 | 44 | 44 | 60 | 88 | .. | .. | Bright, Delustra & Dull, 1-2 |
| | .. | .. | .. | .. | .. | .. | .. | .. | 60 | .. | .. | 60-90 | .. | 90 | .. | 60 | .. | .. | .. | .. | Left & Right Twist |
| Skenandoa Rayon Corp. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40 | .. | .. | .. | .. | .. | .. | .. | .. | Bright & Dull, 1-2 |
| New Bedford Rayon Co. | .. | .. | .. | .. | .. | .. | .. | 24 | 40 | .. | 40 | 24-40 | .. | 44 | .. | 44 | 72 | 88 | 144 | .. | Bright & Newlow, 1-2 |
| | .. | .. | .. | .. | .. | .. | .. | .. | 60 | .. | .. | 60-90 | .. | .. | .. | 72 | .. | .. | .. | .. | Left & Right Twist |
| Tubize Chatillon Corp. | .. | .. | .. | 16 | .. | .. | .. | .. | 40 | .. | 40 | 40 | .. | 40 | .. | 44 | 54 | .. | .. | .. | Bright & Chardonize, 1 |
| **II. ACETATE PROCESS:** | | | | | | | | | | | | | | | | | | | | | |
| The Viscose Co. | .. | .. | 14 | .. | .. | 16 | .. | 20 | 28-40 | 32-40 | .. | 36-46 | .. | 40-60 | .. | 56 | .. | .. | .. | .. | Seraceta, Bright & Dull |
| Celanese Corp. of America | .. | .. | 13 | .. | 13 | .. | 20 | 20 | 26-40 | 40 | .. | 40-60 | 40 | 52 | .. | 80 | .. | .. | .. | .. | Celanese, Bright & Dull |
| Du Pont Rayon Co. | .. | .. | 13 | .. | .. | 18 | .. | 24 | 32 40 | 32-40 | .. | 50-60 | .. | 64 | .. | 100 | .. | .. | .. | .. | Acele |
| Tennessee-Eastman Corp. | .. | .. | 13 | .. | .. | .. | 20 | 26 | 34 | 40 | .. | 52 | .. | 68 | .. | 104 | .. | .. | .. | .. | Bright & Dull |
| Tubize Chatillon Corp. | .. | .. | 13 | .. | .. | .. | .. | 20 | 26 | 33 | .. | 40 | .. | .. | .. | .. | .. | .. | .. | .. | Chacelon, Bright & Dull |
| **III. CUPRA-AMM. PROCESS:** | | | | | | | | | | | | | | | | | | | | | |
| American Bemberg Corp. | 24 | 30 | .. | 36 | .. | .. | 45 | 60 | 75 | 90 | .. | 112 | .. | 135 | 180 | 224 | .. | .. | .. | .. | Bright & Matesa, 1-2 |
| | .. | .. | .. | 75 | .. | .. | .. | 104 | 135 | .. | .. | 225 | .. | .. | .. | .. | .. | .. | .. | .. | |

# TECHNICAL ADVANCES

## *Marked by rayon-staple experiments, new raw materials, and research on creping and sizing*

THE textile industry is certainly tuning up for the entrance of staple rayon as a permanent, recognized, in-good-standing member of the textile family of fibers. Throughout the civilized world experiments are going on to determine the best ways of using it. Patents on new yarns embodying staple are startling textile men in this country—although the particular thing about them which startles is not so often the originality of the patent as it is the lack or originality.

Other patents—including a particularly long series taken out by a prominent acetate manufacturer—show that the folly of taking parallel rayon filaments, cutting them, and then mussing them up to such a degree that they have to be rigorously straightened out again is receiving recognition. As a result, picking, carding, drawing, and roving may shortly be excluded from the staple-spinning operations.

Numerous fabrics already on the market contain staple; but in no case, at least since the recent days of the Roshanara crepe, have such fabrics been sold in any appreciable volume. Handsome things are being said, however, about the possibilities of spun rayon in men's summer suitings, and it is possible that this year will mark the beginning of staple rayon as a common summer-suiting material. It is possible, we say.

But somehow it seems that the industry is more receptive to staple rayon than the present merits of the material justify. There is something psychological about this reception. Textile men have in the back of their heads that the textile raw material of the future will be a man-made fiber and they see in staple rayon—with excellent justification—the beginnings of such a fiber. Since they know that a practical, thoroughly spinnable synthetic fiber is coming, they want to be both mentally and physically ready for it. They learned their lesson when filament rayon, which they had once pooh-poohed, reached its present importance.

But the situation has a parallel in transportation. The rapid progress of the once pooh-poohed automobile led to enthusiastic prophecies regarding the probable rapid progress of the airplane; and, although the airplane has advanced and is advancing, it has not yet progressed as far as was originally predicted for it. For a detailed analysis of the present advantages and disadvantages of staple, the reader is referred to the article, "Staple No Substitute," on page 107 of the September, 1935, TEXTILE WORLD.

### *Rayon Raw Materials*

One of the most interesting developments of the year in rayon manufacture has been the spinning of experimental lots of viscose yarn from wood pulp made from southern pine. Since this type of pulp can be produced for about one-half the cost of the wood pulp now used, and tests indicate that it has satisfactory spinning qualities, the development is of potential importance, not only to the rayon manufacturers, but to the Southern States in which pine is or can be grown. Due to unstable prices in the linters market, there is a tendency for viscose producers to change from a mixture of linters and pulp to pulp exclusively. Despite the improvements made in wood pulp in recent years, the acetate industry is still using linters.

Late in the year it was reported that Italian producers had begun to spin small amounts of wool-like synthetic yarn made from a casein base. Production recently of trimethyl benzyl ammonium hydroxide, a chemical which is said to be the only true solvent for cellulose, may very possibly lead in the near future to some revolutionary changes in the technique of synthetic-yarn manufacture.

In the last twelve to eighteen months both viscose and acetate manufacturers have made a number of installations of new equipment. These installations undoubtedly embody many improvements and refinements, but few details have been made public. One new machinery development, reported late in 1935, is a cake-treating apparatus for pot-spun viscose yarn in which each cake is treated separately. In January of this year a viscose producer announced a continuous method of washing, bleaching, twisting, and winding on one machine. This is believed to be an outgrowth of the Furness process for cuprammonium yarn.

Other developments in yarn manufacture which should be noted are clarification of the status of several basic patents, including those covering acetate-yarn manufacture and those on pigmented-yarn production; introduction of superfine-filament cuprammonium yarns, ranging from 50-denier with 75 filaments to 150-denier with 225 filaments; production of metallized slit cellulose film in strips 1/32, 1/64, 1/100 in. wide; and announcement of Cordura, a special type of rayon of high tensile strength and low elongation for use in truck and bus tires.

### *Crepes and Crepage*

Attention was focused during the year on the various factors which affect the amount and character of pebble in rayon crepe fabrics. In a "Symposium on Crepes and Crepage," which appeared in the September, 1935, issue of TEXTILE WORLD, leading authorities summed up the available knowledge on the influences which, in yarn manufacture, throwing, copping, warp preparation, weaving, and processing, govern the take-up and other properties of viscose and cuprammonium crepe fabrics. Also was discussed a recently developed apparatus for determining the degree of crepage in yarns and fabrics. No attempt will be made here to review the findings of the several contributors to that symposium. This holds true also of the points brought out at the conference on creping, held Nov. 14, in New York, under the auspices of the United States Institute for Textile Research, and reported in our November issue.

There are, however, one or two recent innovations relating to the soaking of rayon crepe yarns which should be cited. First to be noted are the experiments now being carried out in an effort to utilize locust-bean gum as an ingredient of the soaking bath, and second to be mentioned is the development of a modified skein-dyeing

machine for application of the soaking or sizing material to the yarn.

One important fact which has been brought out in the various discussions on crepes and crepage is the need for closest cooperation between yarn producers, throwsters, weavers, and finishers for the solution of their mutual problems. Another is the necessity for further study of all the factors which determine what results will be obtained. It is gratifying, therefore, to be able to report that an appropriation of $2,500 was made by the Textile Foundation to the American Association of Textile Chemists & Colorists for an investigation on rayon crepe problems. The Throwsters Research Institute has made a similar grant and, together with the A.A.T.C.C., will direct the research on this subject.

A new rayon conditioner has been developed which is designed particularly for setting twist in rayon crepes, but which is suitable also for conditioning low-twist rayon yarns. Embodied in the conditioner are a heating unit embedded in a constant-level bath of water, and dry unit automatically controlled to so balance the wet unit that any desired humidity may be maintained. These units are located between the roof of the machine and ceiling of the conditioning compartment. The air, with its vapor, passes through perforated openings in the left wall of the conditioning compartment, across each tier of quills standing on quill boards on the shelves of the truck, and through a fan at the right to repeat the cycle. Controls permit the humidity to be varied between 30 and 95%. The conditioner has a capacity of 70 to 80 lb. of quilled rayon in 15 min. It is suitable also for conditioning rayon on cones, tubes, cops, spools, or bobbins, or in skeins.

## *Warp Sizing and Conditioning*

Interest in warp sizing of synthetic yarns centers on the cooperative research inaugurated by the United States Institute. The investigation which is being carried out at Massachusetts Institute of Technology, under the direction of Dr. J. K. Katz, is progressing fully as rapidly as can be expected, and companies which contributed to the research have received confidential reports of the work to date.

In this country gelatin is favored at present as the adhesive in sizing formulas. Gelatin also is preferred in Germany, although it is common practice there to mix starch with the gelatin. In England, on the other hand, linseed oil is widely used. Both in the United States and in Europe, synthetic resins have been introduced as warp-sizing materials.

Among the more important developments in warp-sizing equipment are a conditioning unit and a stretch-control device, both of which can be applied to existing rayon sizing machines. The conditioning unit is designed to deliver the warp in a properly cooled and conditioned state, soft and flexible, and free from brittleness. In addition to the improvement it makes in the weaving qualities of the yarn, the conditioner permits an increase in the speed and production of the sizer, a speed of 26 yd. per minute being possible with 150-denier viscose, for example. Conditioning is effected by blowing cool, moisture-laden air on the warp as it leaves the last drying cylinder.

The stretch-control device is placed between the section beams and the size box and assures a positive feed-in to the latter. The unit consists of a driven roll 9 in. in diameter covered with flannel or a similar material, with which the yarn is held in contact for 80% of its diameter

*"The rayon-staple situation has a parallel in transportation"*

by two smaller, steel idler rolls, giving a positive grip on the yarn. The stretch unit and the size box are geared together so that the yarn is barely taut between the two. To vary the stretch, change-gears can vary the speed of this unit with relation to the dry cans and the take-up roll in front of the slasher. Advantages are that section beams can be run with a minimum of tension, and it is not necessary to keep changing the weights. Reduction of the working stretch to a minimum leaves a large amount of natural elasticity in the yarn, with resulting higher weaving efficiencies and a fuller and softer feel in the fabric. Wear on the size roll, due to slippage, is largely eliminated.

It has long been prophesied that some practical use would be made of the solubility of acetate in organic solvents; and during 1935 sufficient progress was made in improving the fused collar to insure that this ingenious application of the property is at least one satisfactory fulfillment of the prophecy.

## *Standards and Research*

Committee D-13, the textile committee of the American Society for Testing Materials, made notable progress during the year in the development of rayon standards. The result is that the 1935 edition of "A.S.T.M. Standards on Textile Materials" contains the following entries either originated or revised during the year: "Methods of Testing and Tolerances for Rayon," "Method of Test for Strength of Rayon Woven Fabric When Wet," and "Method of Test for Shrinkage in Laundering of Silk and Rayon Woven Broad Goods." Almost completed is "Method of Test for Slippage in Silk and Rayon Woven Broad Goods." Submitted to letter ballot by the Division of Trade Standards, National Bureau of Standards, was the "Recommended Commercial Standard for Woven Dress Fabrics—Testing and Reporting."

A particularly important piece of research completed in 1935 was that on the take-up in rayon yarns due to twist, participated in jointly by the Throwsters Research Institute, the United States Testing Co., and the National Federation of Textiles. Another, conducted at Cornell University, concerned the relation of orientation to the physical properties of rayons and cottons.

Other technical developments of interest and importance to rayon men, particularly with respect to throwing and weaving, will be found in the review of technical progress in silk manufacture printed elsewhere in this issue.

# PRACTICAL HELPS for Rayon Overseers

IT PAYS to take off and dye the first ¼ yd. woven from a new rayon warp and inspect for wrong denier yarns, mixed rayons, etc. Even where the mill does not have its own finishing plant, a hand method of dyeing these small pieces can be devised.

▼

RUNNABILITY OF cuprammonium yarn on the twister will be greatly improved by maintaining a relative humidity of 60 to 70%.

▼

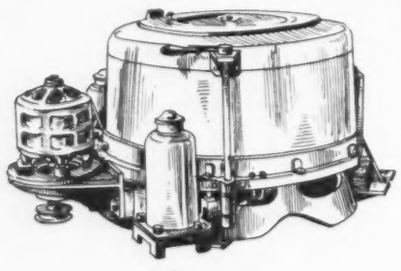
FOR CUPRAMMONIUM yarn, the soaking rule is: "The greater the amount of gelatin, the heavier will be the pebble." This is just the opposite from viscose rayon.

▼

TO INSURE uniform crepage, it is important that the same sizing ingredient be used in both warp and filling, as two different types of material do not come out together in the creping or scouring bath.

▼

EXTRACTING RAYON crepe yarns after soaking down to 100% gives the best results and makes calculations easy. The following condi-



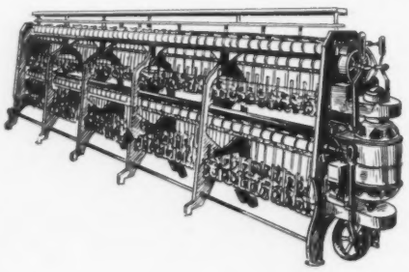
tions should be kept uniform: (1) make-up of the solution, (2) all mixing and soaking temperatures, (3) amount soaked per bath, (4) length of soaking, (5) length of dripping time, (6) amount extracted at one time, (7) speed of the extractor, and (8) length of time of extracting.

▼

SIZING COMPOUNDS for rayon warps should be filtered through screens at least as fine as 40-mesh (under pressure if in concentrated stock form) to remove foreign matter. Size kettles should be cleaned out thoroughly between batches, and barrels or size containers should be steamed out before filling.

▼

THE ANGLE of twist is so great that, as a rule, rayon yarns produced



today cannot be twisted satisfactorily with more than 75 turns per inch.

▼

IF RAYON is breaking between the whip roller and the breast beam, the cause can be found in either poor rayon, poor slashing, or in overcrowding of ends in the heddles or reed.

▼

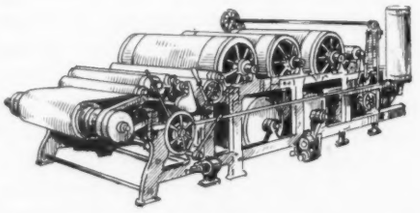
RELATIVE HUMIDITY higher than 65% should not be used in processing viscose rayon. Acetate processes better at a slightly higher humidity. In so far as possible, weavers should keep separate their cotton and rayon weaving.

▼

QUILLING FROM unrolling supply spools will cause variations in tension (because the number of revolutions is increased as the supply spool is depleted) that may later show up as filling bars in the woven cloth.

▼

IN SIZING synthetic yarns, maintain uniform conditions in the temperature of application of size; in



the concentration of the sizing solution; in the pressure of the squeeze rolls; in the temperature of the drying cans; in the speed of operation of the slasher; in the tension of the warp during sizing.

▼

WAVINESS IN rayon crepe may be caused by high spots on the sand drum, by loose drum flanges, or by the lay or batten hitting the harness occasionally while the loom is in motion.

▼

EXCESSIVE TENSION or friction when twisting dull rayon yarns will cause small fibers to stick on the flyers. When the accumulation becomes too large, these dirtied fibers fly off the flyer and attach themselves to the thread, causing black specks.

▼

A MOVING reed should be set to move ¼ in. to secure the best results when weaving taffetas.

▼

THE GREATER the number of filaments in a given denier of rayon, the lighter will be the pebble in crepe fabrics. A heavy sley gives less pebble than a light sley. High twist gives a coarse pebble. A heavy sley, plus a fine yarn, gives a fine pebble; a light sley, plus a fine yarn, gives a heavy pebble; a heavy sley, plus a coarse yarn, gives a fine pebble; a light sley, plus a coarse yarn, gives a heavy pebble. Too many picks per inch reduce the creping qualities. The larger the number of picks in a band of filling, the rougher is the pebble.

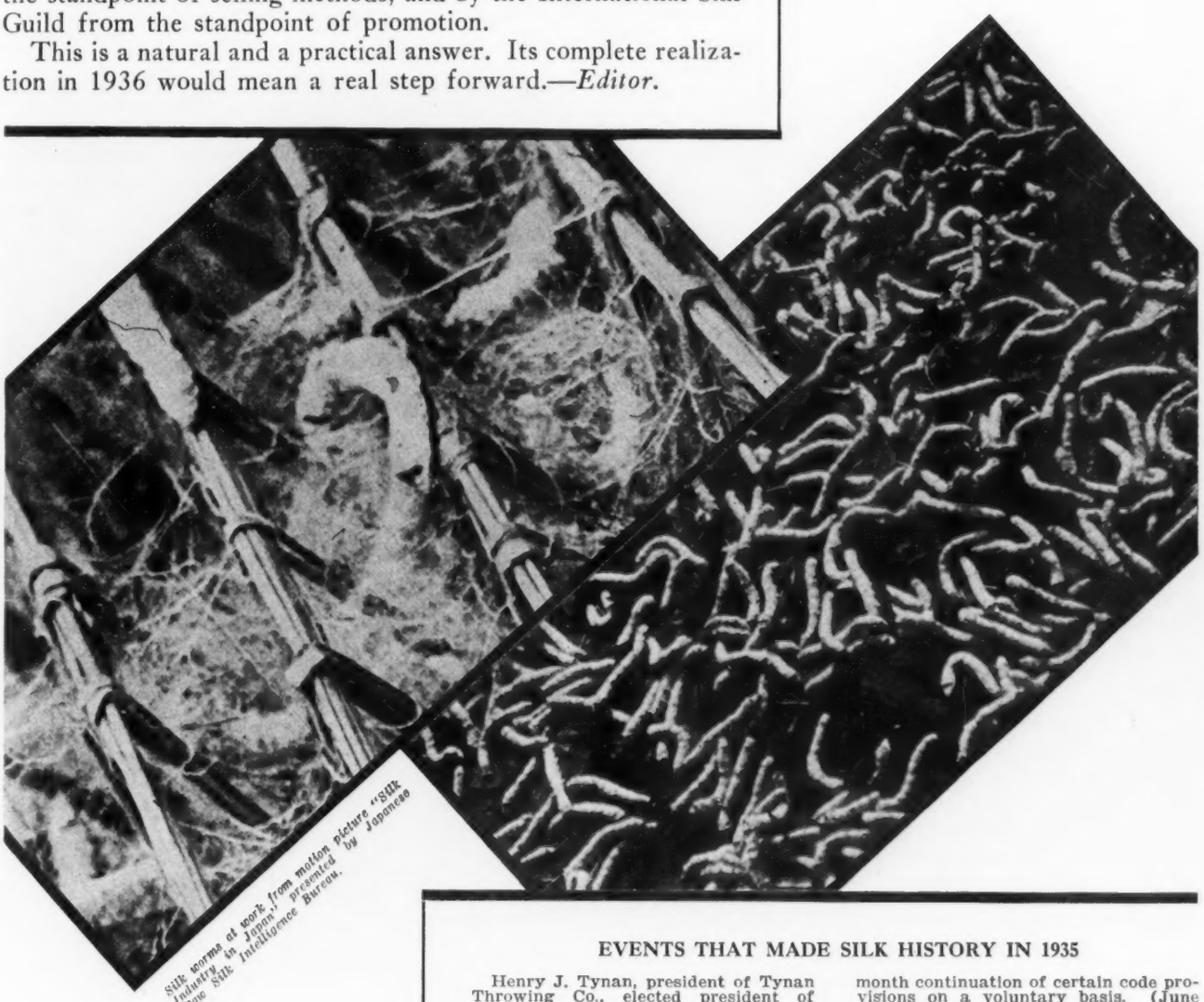
These items have been culled from the 1935 issues of TEXTILE WORLD.

# SILK SECTION

TO OUTWARD APPEARANCES, the silk-rayon ambiguity became even more confused in 1935. Actually, however, there was under way at the end of the year, in our opinion, a definite trend which points a way out of this mess in 1936.

Here is the two-part answer: (1) Silk as a woven textile is merging into a rayon-and-silk category, where the two interests will be identical, and where one association will eventually (and probably this year) represent both. (2) Silk as a fiber, however —that is, as a raw material for consumption in both the hosiery and weaving fields—will become more distinct than ever. Its interests will be protected by the Raw Silk Importers, Inc., from the standpoint of selling methods, and by the International Silk Guild from the standpoint of promotion.

This is a natural and a practical answer. Its complete realization in 1936 would mean a real step forward.—*Editor.*



*Silk worms at work from motion picture "Silk Industry in Japan" presented by Japanese Raw Silk Intelligence Bureau.*

## EVENTS THAT MADE SILK HISTORY IN 1935

Henry J. Tynan, president of Tynan Throwing Co., elected president of Throwsters Research Institute at annual meeting. (Jan.)

5,000 retailers take part in the Silk Review under the auspices of the International Silk Guild. (March 18-23.)

Cheney Bros., South Manchester, Conn., file application for permission to reorganize under Section 77-B of the Bankruptcy Act. (April 2)

Canadian silk companies rebuked for their wage scales by the Royal Commission on Mass Buying. Other textile branches were found by the commission to be in fairly good condition. (April)

Hearings held in Washington to determine whether labor provisions of Silk Code should be amended to conform to Cotton Code, or whether all rayon weavers should be brought within Silk Code. (May 21-25). (Supreme Court decision on May 27 placed hearings in class of merely interesting history.)

Throwsters Research Institute announces that a sufficient number have signed up to put into effect a four-month continuation of certain code provisions on a voluntary basis. (June 28). (Later continued.)

After paying little attention to demand of cotton manufacturers that compensatory processing tax be placed on rayon, silk industry suddenly wakes up to find that rayon leaders are demanding a tax on silk also. (July 13). (Tax issue killed by the U. S. Senate one week later.)

Raw silk jumps more than 13c. per lb. in month that everyone thought would be dull. (July)

Formation of Velvet Manufacturers Association of U. S. as a group to operate within the National Federation of Textiles, Inc. (Aug. 28)

July showing put to shame as raw silk gains 20c. (Aug.)

Second annual Silk Parade is staged on a coast-to-coast scale by International Silk Guild. (Sept. 23-28)

Raw silk gets a little dizzy from rapid price advance and settles down 15c. per lb. (Nov.)

Raw Silk Importers, Inc., withdraws from the National Federation of Textiles to operate independently. (Dec.)

# PROFITLESS PROSPERITY

## *Forces silk trade to recognize need for change*

IF WE were to ignore the significant change of mood which suddenly became manifest in recent months, our analysis of the silk textile industry as regards the 1935 accomplishments and their bearing upon 1936 would be indeed discouraging. Up to the final quarter of 1935 the industry presented this paradox: A rising raw material market, improved consumer demand, healthier national outlook, everything, it would seem, conducive to more profitable business—yet many companies showed losses, two foremost firms in the industry invoked 77b, and only a handful of manufacturers did more than trade dollars. It was a bewildering and distressing picture.

However, the closing months brought a new note; there were signs that the industry intended to take the necessary steps to put its house in order. This trend showed itself in various ways—notably in a movement toward the separation of silk as a fiber from the silk-and-rayon fabric industry. That development brings promise of more profitable business in 1936 since it is helping to clear up the silk-rayon confusion. It is possible indeed that 1935 will prove to have been a turning point toward a new era, and healthier business.

### *Nomenclature a Problem*

Increasing consumption of synthetic yarn, of course, has created a difficult problem. With rayon dominant in woven fabrics, a change in nomenclature is due; we can no longer speak with any accuracy of the "silk textile industry." Indeed there is a definite relationship between the profit prospects and the competitive battle now waging between the silk wing of rayon weavers (especially the small commission mills) as represented by the National Federation of Textiles, and the cotton wing of rayon weavers as represented by the National Rayon Weavers' Association. Examine the 1935 picture of the so-called silk industry from whatever angle you will, and you find yourself returning inevitably to this competitive issue.

To the silk contingent in 1935 the issue had four main phases: (a) lower wages in rayon mills which made possible lower prices of fabrics; (b) dominance of rayon in membership of the National Federation of Textiles which deprived the silk group of adequate representation; (c) steadily increasing adoption of three-shifts; and (d) the problem of properly identifying silk and rayon merchandise to the consumer.

When the current year opened this picture had considerably changed—and for the better. The Raw Silk Importers, Inc., had resigned from the National Federation to operate independently, thus making available to all silk-consuming groups important services which had been abandoned by the Federation. The silk-and-rayon weavers' division of the Federation, which remains a powerful unit and the backbone of the quality broadgoods industry, now is considering the advisability of joining forces with the cotton wing of rayon weavers as represented by the National Rayon Weavers Association. Obviously, various obstacles lie in the way of such consolidation, which will delay its consummation. However, it would seem the solution may lie in some such step, and it is encouraging that the industry is thinking along that line.

As indicated, the most optimistic developments of the year were the happenings of the final weeks. However, it must be noted too that the technical position throughout most of 1935 was favorable. In raw silk prices, the trend was upward until the closing months. TEXTILE WORLD Index shows March, 1935, to be the year's low month with a rating of 29; as the year advanced prices steadied; 30 was the index number for three months; then prices moved upward to 45 in November, after which there was a decisive drop. The 1935 monthly average was 35 against 28 for 1934. Silk's rise was ascribed to three main causes: (1) increased U. S. demand; (2) curtailment of production in Japan; and (3) increased silk consumption in Japan. In its earlier stages the rise had a tonic effect on both broadsilk and hosiery prices; eventually, however, the advance showed signs of forced skyrocketing. Levels were so high that some weavers turned to synthetics and thus the turn of the year found raw silk easing off to levels well below its 1935 peak.

*Typical of the silk industry's vigorous promotion is the new silk fabric shoe for men, an evening wear item, which is being effectively promoted by the shoe trade in cooperation with William Skinner & Sons, silk manufacturers. The shoe is covered with ribbed silk fabric with drill backing*

### *Silk Rise a Help*

The tonic value of the silk rise is indisputable, coming after those many years of doldrums. The effect is evident in raw silk deliveries data. Despite the upward price trend, the year 1935 with 497,143 bales shows an appreciable increase over 1934 when deliveries totaled only 461,706 bales. From the primary market side, therefore, the picture is one of activity and strength.

Indeed the whole industry evidenced a degree of soundness in the difficult period following dissolution of the

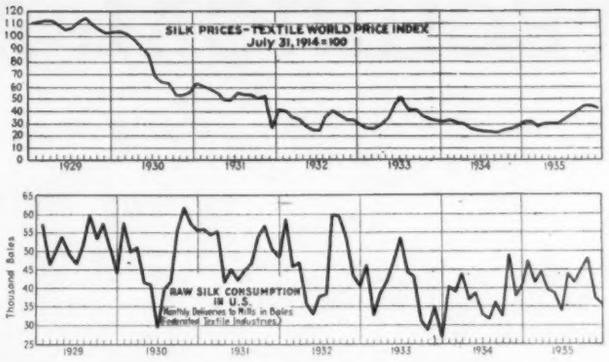
NRA. The broadgoods branch reflected the general attitude when it refused to consider any post-NRA agreement, and equally when it sought to continue the chief NRA wages-and-hours provisions.

An industry-wide effort was then put into motion, with at least temporary success, to save the best of the NRA code; derelictions of course were frequent and were blamed on the competitive situation prevailing between the silk wing and the cotton wing of rayon weavers. Through the second half of 1935, there was evident an increasing desire to better inventory control; yet little progress was made to that end; here again, the behavior of the one branch took color from the behavior of the competing branch, resulting in a mutual increase of three-shift operation

*This all-button coat-dress made of heavy silk suiting in a Glen Urquart invisible plaid is one of the new season's novelties which is winning both fashion and consumer approval. Note the double-breasted effect. The invisible plaid interprets the trend away from more pronounced checks. (Internat. Silk Guild.)*

which of course hindered the movement to control production.

The industry's merchandising activity was constructive. The International Silk Guild, promotional unit for the raw silk group and its customers, followed its "Silk Parade" of fall, 1934, with a "Silk Review" in spring, 1935, which in turn was succeeded by a second "Parade" last fall. These events had two values: first, they were individually




successful in stimulating seasonal movement; second, they followed each other so rapidly that the series had a cumulative effect which greatly enhanced the prestige of silk.

Identification of silk merchandise is being pushed more and more to the fore, and promises to be a major phase of promotion in the current year. Special effort will be made toward wider use of the Guild's Silk Label. An interesting point of the Guild's program is the growing emphasis on silk hosiery promotion; considering the keen interest shown in the new hosiery styles, i.e., the navy, wine-green color trend, etc., and the fact that hosiery now represents upward of 60% of raw silk consumption, this is a most logical development.

Recognition also should be given to the vigorous promotional work done last year by the Velvet Guild. Favored by style winds which brought smooth sailing to the entire range of glamorous fabrics, the silk-back velvets sold spiritedly at profitable prices. Introduction of the crush-resist velvets in mid-year lent added interest; these processed fabrics enjoyed a demand which promises to materially increase this year.

## *Must Solve Silk-Rayon Tangle*

With respect to the 1936 outlook generally, one issue is paramount: The silk textile industry will not be in tune for profits, or for anything else except perhaps 77b, unless and until decisive steps are taken to solve the silk-rayon entanglement. This issue can no longer be dodged or evaded; it constitutes a crisis on which depends the solvency of the industry in 1936. Let us face the facts frankly. The silk textile industry as such is today little more than a name. Progress hereafter will have two definite trends: (a) toward a completely separate raw silk group for both merchandising and trade relations; and (b) toward a fabric industry consuming both rayon and silk which will be concerned primarily with fabric and *not* fiber, and sufficiently unified that it will operate under more equable trade conditions than those which now prevail.

Silk

## *Silk Prices and Silk Mill Activity for 1935*

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | 1935 Monthly Average | 1934 Monthly Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRICES | | | | | | | | | | | | | | |
| Textile World Index Number Raw Silk...(July 31, 1914=100)... | 32 | 31 | 29 | 30 | 30 | 30 | 33 | 37 | 41 | 45 | 45 | 43 | 35.5 | 32.2 |
| KEY QUOTATIONS (dollars)* | | | | | | | | | | | | | | |
| Raw Silk Crack XX 13/15, white 78% | 1.52 | 1.42½ | 1.42½ | 1.34 | 1.40 | 1.39 | 1.40 | 1.57 | 1.87 | 1.96½ | 2.14½ | 2.04½ | 1.62 | 1.37 |
| Thrown Silk Tram Stnd. Japan 85%.. | 2.35 | 2.27½ | 2.30 | 2.20 | 2.27½ | 2.22½ | 2.22½ | 2.42½ | 2.67½ | 2.67½ | 2.95 | 2.65 | 2.44 | 1.98 |
| Spun Silk 60/2..... | 2.85 | 2.95 | 2.75 | 2.75 | 2.75 | 2.75 | 2.75 | 2.75 | 2.75 | 2.95 | 2.95 | 2.95 | 2.83 | 2.95 |
| ACTIVITY | | | | | | | | | | | | | | |
| †Silk Deliveries (approximate bales)... | 47,443 | 41,732 | 44 347 | 39,757 | 38,361 | 33,728 | 44,166 | 41,715 | 45,156 | 48,167 | 37,012 | 35,559 | 41,429 | 38,476 |
| Stocks, end of Month (bales)..... | 48,516 | 48,727 | 36,583 | 37,587 | 36,762 | 42,018 | 32,654 | 37,381 | 38,680 | 46,777 | 51,458 | 54,941 | 42,674 | 67,747 |
| **Broad loom Activity % of available looms used on basis of 80 hours per week per loom..... | 65.2 | 66.5 | 58.5 | 54.6 | 46.6 | 43.4 | 39.2 | 42.5 | 41.7 | 43.8 | 42.2 | 39.4/ 43.0†† | 48.2 | 45.1 |

*First of month. **All broad loom percentages on four-week periods, totalling 13, instead of calendar months. †Includes re-exports. ††Estimated.

# TECHNICAL ADVANCES

## *In silk branch include improved "ringless" soaking, new throwing and weaving machinery*

IN RECENT years the term "silk mill" has come to have rather an ambiguous meaning. Some five or six years ago it was the term "rayon mill" which was ambiguous, because then there was no distinct rayon industry, as rayon weaving and related processes were housed in either a silk or a cotton mill. But conditions are now such that the term "silk mill" has been amplified to "silk and rayon mill"; and shortly, it seems, particularly if the recent rise in the price of raw silk is to any degree permanent, this amplified term will be reduced to "rayon mill"—with a meaning this time.

It is mainly in women's full-fashioned hosiery that the silk worm is making his last stand—not to alarm the ladies, we hasten to add that we are speaking figuratively—although silk is and will continue to be found in certain high-priced dress and upholstery goods and certain strong and light mechanical goods, such as parachute cloths. Since silk throwing has become to no slight degree a branch of the hosiery industry, it is logical that, in discussing the tuning up of silk processes, we first turn our attention to those which concern hosiery yarns.

### *Soaking for "Ringless"*

The modern three-carrier method of knitting full-fashioned hosiery was introduced to overcome the unevenness problem which silk yarn—in common with all other natural-fiber yarns—presents. It has helped materially—as has also the nine-meter method of testing evenness introduced just a few years ago by Warren P. Seem. But the problem has not been completely solved, and the hosiery mills still have to contend with the defect known as washboard, which in certain cases can be laid to poor-quality silk, uneven yarns, improperly wound cones, and uneven conditioning. Therefore raw-silk men and throwsters still have to exercise vigilance if they wish to ward off the gradually approaching attack of the spinneret.

One important line of defense—beyond the natural superiority of silk in the matter of strength and in its inherent adaptability to kinking satisfactorily around the full-fashioned needles—lies in further improvement of the soaking process. Many mills have found direct-running yarns superior to conditioned yarns for three-carrier work. The same soaking materials, however, appear to be applicable to either treatment, although they must be used in different amounts. For direct knitting, for example, more alkali is needed than for box-conditioned yarn.

It has been found that a particularly soft silk is produced when potassium carbonate is used, but more of this alkali is needed when mechanical operations are to be conducted in a dry atmosphere than in a humid atmosphere.

Hygroscopic agents are now commonly employed to keep a normal regain in the yarn. Recently, however, it has been found that solutions containing a penetrant, plasticizer, and lubricant produce a conditioned silk which, even if not used immediately, will be little affected by either dry or wet atmospheric conditions. Careful control of the pH value of soaking baths has been found essential.

### *Improvements in Throwing Machinery*

Progress is being made in other departments of the throwing plant. New doubler-twisters have accessible and readily adjusted driving mechanism. One such machine, capable of operating at 10,500 r.p.m. on twelve turns, has each ring and separator swinging with the corresponding spindle bolster in order that all three elements will be in constant alignment with each other; and it also has the feed-roll gearing totally enclosed and its porcelain eyes held to the guide fingers by easily opened wire clamps. The possibility that the large-package principle is about to enter the throwing field is indicated by the development of a double-twister with a 7-in. traverse.

Automatically adjusting spindle bearings on a new skein winder keeps the entire driving surface always in contact. Another spindleless winder made its appearance during the year, as did a new spindleless redraw frame capable, it is said, of operating with a take-up of 500 yd. per min. Another redraw frame, capable of a speed of 1,800 r.p.m. and equipped with a three-speed transmission, rests a wire against the thread; and this, when the machine stops, falls and forces a rubber-surfaced brake against the flanges of the delivery bobbin to prevent further turning. Straight traverse cams have now been applied to winders, twisters, and redraws for avoiding jumping.

A new traverse bar for skein winders and twisters locates its self-threading guides close to the bobbin to insure accuracy of wind and permits the yarn to run in a straight line from pigtail to bobbin, thus reducing pressure and wear on the porcelain. The ball-bearing retainer rolls on the twister fingers for holding gudgeonless bobbins has been made adjustable to different sizes of flange. A new winder swift, particularly suited to covered-rubber yarns, has pistonlike arms which simplify the placing-on of skeins and afford uniformly maintained tension as the skeins run down. A cellulose-acetate plastic, which takes an exceptionally high polish, has been applied to the traverse wheels on filling winders.

In April, at the Knitting Arts Exhibition, which in recent years has become something of a throwing arts exhibition, an ingenious yarn tension suitable for redrawing and any other use where yarn is delivered over-end was demonstrated. In its original model, it is bulky and will require redesigning before it is applied commercially to yarn machinery. It operates without the pressure of disks or any other common type of friction. The yarn passes around a small pulley whose freedom to turn is governed by drag from an electro-magnet. Hence the tension on the yarn is susceptible of infinite adjustment.

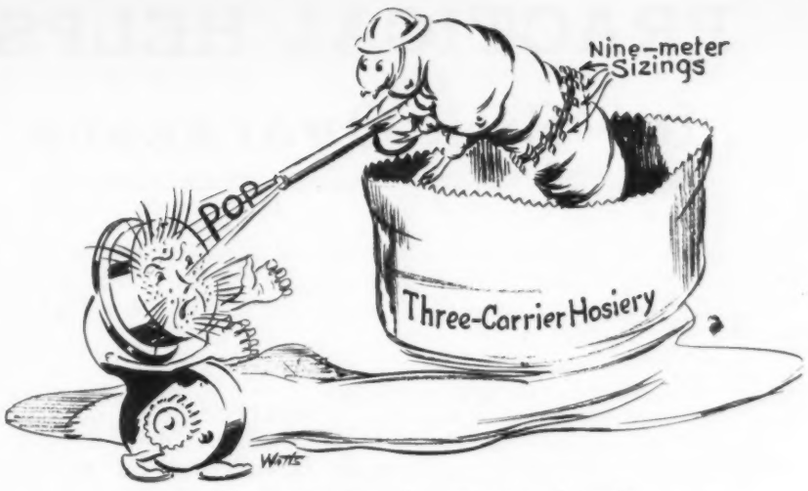
A high-production twister operating on a new principle, which involves the passage of yarn through a hollow spindle, is shortly to be announced.

Outstanding among the weaving developments is a new silk and rayon 4x1-box loom with a shuttle-changing motion operating on the top two shuttles, and a feeler indicating filling depletion in the other two. It is intended, of course, that filling for the ground of the fabric shall be placed in the top boxes, while the more slowly exhausting yarns of decoration shall be put in the bottom boxes. When the loom stops for a non-automatic replenishment of filling, the shuttle can be ejected from the box by the mere pressure of the weaver's foot on a pedal.

Interesting and important experiments now under way indicate that in the next year or two the problem of accurate joining or cloth-setting will at last be definitely solved.

A new pinless warp-tying-in machine ties 250 knots per minute.

Other, less important, weaving developments include a new feeler for use with electric warp stop motions, which is equipped with a renewable bronze bushing (with oil wick) located at the main point of wear and which makes its electric contact through two platinum-irridium points; several improved shuttle tensions; and a new heddle having a highly polished eye and shaped to accommodate the flat strips of metal used in tinsel weaving.




*In full-fashioned hosiery the silk worm is making a determined and very successful stand against the spinneret*

### *Standardization Progress*

Silk was identified with some of the important standardization work conducted during the year, although in most cases it had to share the honors with other fibers. Silk fabrics are of course affected by the "Recommended Commercial Standards for Woven Dress Fabrics—Testing and Reporting," recently submitted to letter ballot by the Division of Trade Standards, National Bureau of Standards. It plays an even more prominent rôle in the "Proposed Method of Test for Slippage in Silk and Rayon Woven Broad Goods," on which Committee D-13, the textile committee of the American Society for Testing Materials, is at work. The "slippage" concerned in the last-mentioned standard is the sliding of one set of threads (that is, either warp or filling) along the other set at the seams of garments, parachutes, etc. Strictly a silk matter, of course, was the new, more rigid, Raw-Silk Classification Table adopted by the Japanese government in July.

Although the new terms "S" and "Z" for designating directions of twist in yarns apply to the entire textile industry, it is interesting to note that silk men were the first to adopt them. It was shortly after they had been proposed in TEXTILE WORLD that H. E. Bishop, secretary of the Throwsters Research Institute, assembled a committee from all branches of the industry to discuss them and promote their use. The first organization to adopt them officially was the Raw-Silk Committee of the National Association of Hosiery Manufacturers. In June, 1935, they were approved for all yarns by the textile industry's leading standardizing body—Committee D-13—and were given the following D-13 definition: "A yarn or cord has S-twist if, when held in a vertical position, the spirals conform in slope to the central portion of the letter 'S,' and Z-twist if the spirals conform in slope to the central portion of the letter 'Z.'"

Outstanding among the 1935 reports on research was one made by Warren P. Seem and Prof. Thurman Andrew, on the influence of twist on diameter, shortening, shade, and dullness of silk hosiery yarns. The tables developed by these gentlemen are an aid to planning styles, making comparisons, and estimating costs. Diameter affects covering power, sheerness, and the visibility of rings and other defects. Shortening discloses the torsion on the yarn and the tendency to kink and twist, in addition to the important decrease in yardage per pound.

### *Research on Silk Problems*

Another report—by Prof. Fred Mennerich, of the University of Wisconsin, and Dr. O. A. Hougen, of the U. S. Testing Co.—considered the diameter ratio of silk filaments as related to two-tone dyeing. They found that when the ratio of the smallest diameter of a filament to its largest diameter exceeds .04, two-tone dyeing becomes noticeable and there is little which can be done to prevent it in soaking, boiling-off, and dyeing.

A third report—by Esther Bruner and Mina Goehring, of the Kansas Agricultural Experiment Station—concerned the deterioration of silks caused by light of different wave lengths. They determined the significance of various X-ray diffraction patterns of silks which have been exposed to light, and they established evidence that lead-weighted silks deteriorate more rapidly than tin-weighted.

Test data reported by William D. Appel and Daniel A. Jessup, of the National Bureau of Standards, indicate that the amount of deterioration caused by light is not determined by the percentage of weighting and that, while some weighted silks deteriorate badly, others are as resistant to ageing as are some pure-dyed fabrics.

Other reports included one on the degradation of silk fibroin by acid and alkali, prepared by Eunice Chamberlin Walde and Rachel Edger, of Iowa State College; one on silk fibroin dispergation, by M. A. Kise, of Yale; and one on silk degumming, by Dr. O. A. Hougen.

Aids to research introduced to the trade during the year include a cross-section slicer which produces sections as thin as 0.0001 in. ready for examination within 10 min., and an adjustable illuminator for microscopes which gives a well-balanced light, is attachable to the objective, and is suitable for use with either opaque or translucent specimens.

# PRACTICAL HELPS for Silk Overseers

WORMS AND BROKEN ends that appear in weaving may be caused by the silk being improperly soaked. To prevent the trouble, a few skeins from each new lot of raw silk should be inspected, soaked in the usual manner, and then inspected again for split ends. The bath can then be strengthened or diluted if necessary.

▼

WHERE "SNOWBALLS" of waste appear between the reed or false reed and harness, they may be due to an accumulation of gummy substance carried by the silk from the soaking operation and rubbed off on reed or harness. A light rubbing with gasoline will remove the gummy accumulation.

▼

WHEN THE WARP runs out, a check-up of the following parts will prevent unnecessary breakdowns when the loom is running: shuttles, center stop, protection, lift, crank-arms, reed frames, pickers, pick-shaft bearings, pick-roll arms, picker sticks, picker shoe blocks, loose keyways, head motions, harness wires, harness cords, jack eyes, take-up, whip-roll pin, whip-roll stands, bumpers, and check straps.

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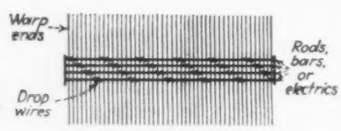
STICKING of drop wires, particularly when weaving velvet, can be prevented by the following system of applying the wires: Put the *first*




drop wire on the *first* end of the warp and on the *first* rod; put the *second* drop wire on the *second* end and also on the *first* rod; put the *third* wire on the *third* end and on the *second* rod; put the *fourth* wire on the *fourth* end and also on the *second* rod; etc.

▼

A GOOD rubbing oil for hiding chafe marks caused by wet finishing on par-weighted, flat silk crepe, can be made by dissolving 2 qt. of denatured olive oil in 1 qt. of carbon tetrachloride, and diluting to 2 gal. with naphtha.

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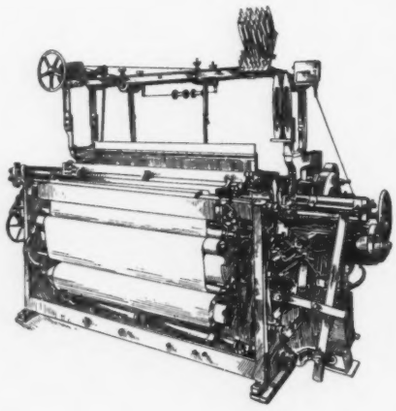
PREFERABLY the tail on single-box silk-loom leather pickers should



be pointed up, as this is less likely to force the picker out of shape and subject it to early damage.

▼

SLACK TWIST on old-type spinning frames can frequently be overcome by installing an extra idler cup between the first and second spindles at both the back and front of the frame. When installing these extra idlers, it is a good policy to replace all the idlers so there is an idler between every fourth spindle, or fourteen idler cups to a rail of fifty spindles.

▼

MANY PROBLEMS that arise in producing crepes are due to constructions which have been designed with no "margin of safety." A moderate factor of safety (additional twist and/or additional yarn, and/or additional width) definitely prevents minor and processing variations from manifesting themselves as serious variations in finished merchandise.

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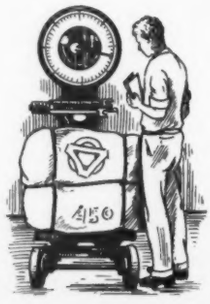
BECAUSE OF the relatively high cost of the material, scales used for




weighing raw silk and silk products should be of the lowest capacity possible, as such scales are more accurate than those with high capacity. It is preferable to limit the capacity to just a small amount more than is actually required for the maximum weight indication needed.

▼

SATISFACTORY CREPE of schappe or spun silk yarn will be aided by soaking as follows: For every 100 lb. of schappe or spun silk, use a soaking bath composed of 65 gal. of water charged with about 15 lb. of a sulphonated coconut oil and about 6 lb. of a high-grade gelatin; soak for 20 to 30 min.; extract; hang up to dry; and throw.

▼

EXCESSIVE TWIST in the filling sometimes causes gum bars where the soap liquor cannot completely penetrate the tightly shrunken cloth. It is possible to guard against both of these faults simply by pre-soaking the cloth for 30 to 60 min., at about 180° F., in soft water containing either 1 gal. of 28° Bé. ammonia or 10 lb. of borax to 1,000 gal.

▼

FOR SPOT-CLEANING of gray goods, make an emulsion of 2 parts of sulphonated olive oil with 1 part each of hexalin and pine oil. This emulsion is applied to the spots and is permitted to soak for about 30 min. before the cloth is put into the boil-off liquor.

These items have been culled from the 1935 issues of TEXTILE WORLD.

# KNIT GOODS SECTION

THE KNIT GOODS INDUSTRY has made, and is making, progress. To some this meant actual increase in profits in 1935 over 1934; to others, a steady improvement in the latter part of last year so that their profit outlook is now better.

Trace this back and one of the principal causes becomes clear: vigorous and original styling. Outerwear mills were especially successful in discovering new products for their machines; yet they were not alone. In underwear, the daring, even though short-lived, innovations in men's underwear reflected a healthy determination to stimulate consumer interest. And hosiery knitters introduced their blue hosiery—now followed by green and wine shades.

Many of the new styles proved real hits. There were, as always, some duds—but even the duds imparted a vigor which remained and which now represents one of the chief potential assets of 1936.—*Editor.*

Knitting

## EVENTS THAT MADE KNITTING HISTORY IN 1935

Hosiery Code Authority releases figures on census of seamless hosiery machines showing 129,500 units, with 38% on men's seamless and approximately 24% on women's seamless.

Knitted Outerwear Week, including both an exposition and a convention, fostered by National Knitted Outerwear Association is held in New York. (Feb. 11-15)

Knitters get their share of Japanese competition problem when imports from that country jump 300% over same month of 1934. (March)

Knitting Arts Exhibition, combined with conventions of hosiery and underwear groups, draws 34,000 visitors to Philadelphia. (April 22-26)

William H. Gosch, of Nolde & Horst Co., elected president of National Association of Hosiery Manufacturers. Ralph M. Jones, of Utica Knitting Co., elected president of Underwear Institute. (April 25)

Experience with voluntary curtailment helps industry to keep its balance when the Supreme Court throws out the NRA. (May 27)

Hosiery and outerwear groups give up plans to have mills sign on the dotted line to the effect that they will continue certain features of the code. Manufacturers sympathetic, but don't like idea of signing their names to anything. (July)

Ingram Bergman, of Bergman Knitting Mills, chosen president of the National Knitted Outerwear Association. (July)

Lessing J. Rosenwald, chairman of the board of Sears Roebuck & Co., hands down a compromise decision as arbitrator of the dispute between the American Federation of Hosiery Workers and the Full-Fashioned Hosiery Manufacturers Association. (Aug. 27)

Full-fashioned hosiery prices pushed up 25 to 50c. per doz., due to increased cost of raw silk which had been rising since July. (Sept. 3)

To carry out some of labor clauses and competitive practices sections of old NRA, underwear industry gets itself Code of Business Practice and Conduct for Underwear and Allied Products Manufacturing Industry. (Dec.)

Prices on new lines of full-fashioned hosiery are raised 10 to 75c. per doz. (Dec.)

# "DON'T ROCK THE BOAT" . . .

## *Was knit goods keynote through NRA transition*

THE knit goods industry, like most other textile divisions, will remember 1935 chiefly as the year of transition from Federal regulation back to self-government. And it may be remarked in opening that the intelligence and stability with which this difficult transition was effected in 1935 is a happy augury for knit goods in 1936. As the National Recovery Act approached expiration, even the most optimistic leaders were fearful of the effect it would have on the market. Events proved these fears to be unfounded. The act died precipitantly, yet, it had little or no effect on market tone. It seems that the mills fared at least as well after the death of NRA as they did during the closing months of its life. Some firms report that profits were bigger in the second half of 1935 than in the first; however, this presumably was due in part to the pick-up which began in NRA days.

A thumb-nail inventory of the present situation in the three knit goods branches shows three chief gains: First, manufacturers are more statistics-conscious and less inclined to follow up a moderate sales rise with excessive production. Second, all branches are clearly determined *not* to backslide to pre-NRA conditions on labor or trade practices. Third, the styling job was tackled with such skill and vigor as to promise further merchandising progress during 1936.

**Hosiery**—Hosiery manufacturers welcomed the dissolution of the NRA because it marked their return to self-government, and they refused to sign any post-NRA agreement. However, most firms endeavored to observe the NRA labor provisions. With respect to stock control the year 1935 evidenced two important points of progress: first, that manufacturers can and will curtail voluntarily, as shown in the fact that the voluntary May curtailment was so effective as to render unnecessary a mandatory NRA curtailment; second, mills favor prevention rather than cure for over-production, as shown in the December, 1935, response to the National Association's appeal to curtail in advance of the slow mid-winter season.

*An attractive window to promote "Muffin" shade in Gotham hosiery*

Financially the year was one of moderate improvement. Some companies showed remarkable gains, but generally the pick-up was conservative. One foremost firm which reported $203,091 loss in the first half of 1934, netted $92,774 in the same period last year. What is more significant, another firm's report showed higher profits in the second than in the first half of 1935. Indeed, for most firms, the improvement did not become pronounced until toward mid-year. The second half of 1935 marked a step forward both with respect to income and business generally. The upward trend of raw silk and wool prices had a good psychological effect on hosiery. Of course, this rise was reflected in hosiery rates. The prices of some lines were advanced 25 to 50c. per doz. in August, this marking the start of a general upward trend which continued until the end of the raw silk boom in the final months of 1935. The hosiery price advance met the new raw material prices, but it did not solve the manufacturer's problem of higher costs of labor, etc. However, it did tone up generally and at the end of the year most large mills reported an improvement.

Hosiery production figures issued by the Bureau of the Census show a consistent rise in 1935 as against 1934. Output in July, 1934, which was the low month for that year, totaled 4,426,000 doz. pr., against 5,628,000 doz. pr. in June, 1935, which was the low month for that year. In November, the high month for 1934, the output was 7,009,000 doz. pr., against 8,880,000 doz. pr. in October, the high month for 1935. This increase was shown in about the same ratio throughout the year, bringing the 1935 total to about 86,272,000 doz. pr. as against about 69,260,000 doz. pr. in 1934.

In hosiery merchandising, the year brought three important developments: (a) Extended popularity of knee-length hosiery with indications that this line will continue in the foreground this summer; (b) definite acceptance of the three-carrier as a dominant development extending through the entire range of women's full-fashioned; and (c) increased effort to widen the hosiery spectrum, as manifest in the effort to follow last year's navy with wine and green shades.

The outlook is clouded by some serious problems. The Social Security Act, it is estimated, will cost the full-fashioned and the seamless mills, respectively, $1,462,000 and $698,000 each year. The ringless hosiery litigation is another obstinate difficulty. It is to be hoped this legal snarl will be settled promptly, to eliminate the present hesitancy among buyers. Viewing the situation broadly,

however, it can be said that the hosiery industry has acquitted itself competently since its return to self-government and may be expected to prove equal to the future issues.

**Underwear**—With due allowance for the problems which are still unsolved 1935 was a year of definite progress for underwear manufacturers. Three chief points suggest themselves as highlights: (a) the downward trend of prices, which had continued since late 1933, appears to have definitely halted; (b) manufacturers are determined to keep stocks within demand limits, as shown in fact that December, 1935, inventories were 15% below 1934, while demand had not declined; (c) the principal benefits of the NRA, such as wages, hours of labor and trade practices are still observed fairly generally.

The development by the Underwear Institute of a voluntary agreement which mills now are in process of signing was an important feature of the year. This agreement is novel in that it aims at enforcement through a system of damage claims, these being developed on the theory that those violating the agreement caused damages to the firms which complied.

With respect to prices, manufacturers adopted a "don't rock the boat" attitude. While sporadic weaknesses showed at times, prices in most cases were steady to upward and at the end of 1935 levels were approximately 20% above the low of 1933. However, since American industry as a whole has achieved a price advance of 42% in the period 1933-35, it is clear that the underwear industry's task of putting itself definitely in a profit position is not yet completed. Few underwear mills did more than break even in the first half of 1935; it was not until the closing months that any tangible signs of profitable operations were manifest.

The tendency to hold production more closely to sales average was indicated in a month-by-month curtailment through the year. Credit for the success of this effort should go to the Underwear Institute, which kept mills advised by four-week periods of the industry's stock position and constantly urged them to hold down output.

**Outerwear**—While it cannot be said that 1935 brought more than a moderate profit increase to outerwear mills the year was marked by progress in three directions, the combined effect of which should be to materially increase net earnings in 1936. These points of progress are: (1) Continued adherence to the chief NRA provisions, as indicated in extensive use in the post-NRA period of the code label of the National Knitted Outerwear Association; (2) profit prospects were strengthened through an aggressive merchandising job in which clever styling played an important part; and (3) the industry's 1936 needs were crystallized in a four-point program now being followed by the National Association.

*"Shamrocks" knitted of linen yarn and just introduced by Julius Kayser*

The importance of these gains shows up clearly in the present status. The outerwear manufacturers recognized the benefits of the NRA and, while they opposed any new post-NRA agreement, they likewise opposed—for the most part, at least—any return to the old order of ruthless individualism. As a result of this more enlightened viewpoint, the industry now is moving toward improved labor relations on one hand and improved trade relations on the other. With respect to merchandising, and especially styling, the outerwear industry's record is one to be proud of. An impatience with the status quo, a restless inventiveness which found new markets through new fashions—these traits were dominant all year. Within the seasonal divisions demand was steady and prices held firm, though in most cases the profit margin was slight.

The National Association's four-point program: (a) promotion; (b) trade practices; (c) standardization of depreciation; and (d) standardization of garment sizes—is gradually getting under way and may prove a milestone in the industry's progress during 1936.



## *Hosiery and Underwear Production in 1935*

Compiled from figures issued monthly by the Bureau of the Census, Department of Commerce, in thousand dozens (the last three ciphers being omitted)

| | 12 mo. Totals | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | 1935 Monthly Average | 1934 Monthly Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HOSIERY | | | | | | | | | | | | | | | |
| Full-Fashioned | 30,058 | 2,506 | 2,477 | 2,656 | 2,531 | 2,384 | 2,101 | 1,978 | 2,532 | 2,639 | 3,139 | 2,808 | 2,307 | 2,504 | 2,064 |
| Seamless | 36,589 | 3,249 | 2,902 | 3,181 | 3,076 | 3,138 | 2,478 | 2,519 | 2,951 | 2,441 | 3,973 | 3,698 | 2,983 | 3,040 | 2,543 |
| All other lines | 18,495 | 1,670 | 1,667 | 1,621 | 1,492 | 1,559 | 1,048 | 1,128 | 1,361 | 1,416 | 1,767 | 1,810 | 1,856 | 1,541 | 1,164 |
| Total Hosiery | 86,272 | 7,549 | 7,047 | 7,459 | 7,110 | 7,133 | 5,628 | 5,661 | 6,844 | 7,497 | 8,880 | 8,317 | 7,147 | 7,189 | 5,771 |
| UNDERWEAR: | | | | | | | | | | | | | | | |
| Men's union suits—all weights | 2,646 | 261 | 251 | 238 | 222 | 209 | 212 | 202 | 201 | 193 | 235 | 218 | 204 | 220 | 307 |
| Women's union suits—all weights | 950 | 62 | 62 | 71 | 62 | 77 | 79 | 69 | 92 | 94 | 112 | 92 | 78 | 79 | 115 |
| Total underwear | 18,276 | 1,471 | 1,525 | 1,657 | 1,881 | 1,836 | 1,437 | 1,271 | 1,479 | 1,390 | 1,618 | 1,389 | 1,322 | 1,523 | 1,537 |

# TECHNICAL ADVANCES

## *In knitting field include greater versatility and design capacity of machines*

ALTHOUGH knitters who have not kept their methods and equipment up to date during the last few years have many improvements to make if they are to tune up for the profitable era now in sight, the newest opportunities offered to them are largely, although not entirely, confined to improved versatility and design capacity of machinery.

Who would have dreamed a few years ago that it would ever be possible to make a tuck-pattern change-over in 1 min.? That point was reached on spring-needle body machines in 1934; and on a new 30-step-float spring-needle machine introduced in 1935 only 5 min. is required to change over a float pattern.

Quick change-over and the elimination of cam expense were also made possible in 1935 on an automatic latch-needle rib body machine, in which case swivel cams in the dial, operating needles of four different butt and latch lengths, can produce many tuck patterning effects.

Increased patterning scope was likewise achieved on various circular, latch-needle, pattern-wheel, sinker-top, body machines by means of a so-called separating cam which quickly drops needles from tuck position to welt or floating position. This separating cam was also responsible for two other important developments. One was a so-called "three-position" pattern wheel, wherein a high insert gives an ordinary stitch, a low insert gives a tuck, and an open slot gives a float, permitting an increased variety of patterning with the "floating" yarn interlocked or buried in the fabric. The other is a rib body machine with pattern wheels on both cylinder and dial capable of producing a true double-faced fabric and also permanent raised or blistered effects on the face. The latter machine is already in extensive use for the manufacture of new bathing-suit fabrics for 1936.

### *Ringless Hosiery*

Although the date for the beginning of the ringless-hosiery-patent trial is being constantly postponed and the industry has a correspondingly longer time to wait for a decision, the addition of a few months probably makes little actual difference in the case of litigation which may require several years for completion. In the meantime, although agents for the litigants are feverishly searching through old records for evidence of prior use of the three-carrier idea or for evidence of the lack of such use, the full-fashioned industry has pretty well tuned itself up for the manufacture of ringless stockings. In fact, such stockings are the staple full-fashioned hosiery of today.

The great problem which the three-carrier development introduced, or at least intensified—washboard—has been overcome to an encouraging degree as the result of experience. The cause of washboard has been found to be not one thing or two things—Walter A. Simond, in an able summary published during the year, finds it to be ten things, and he suggests the following precautions to overcome them: (1) Buy good-quality silk. (2) Keep carriers and tubes smooth and clean. (3) Inspect snappers with pocket microscope for corrosion. (4) Replace grooved falling rings and insure uniform weights of rings. (5) Keep tensions free of gum. (6) Use open-wind, medium-size cones wound at medium tension. (7) Insure uniform conditioning and avoid stripping of the gum. (8) Keep metal parts which are in contact with silk clean and properly lubricated. (9) Set verge plates and jack beds accurately—although Mr. Simond believes most knitters put more reliance on this precaution than is warranted. (10) Test slur cocks for wear on knitting surface and insure accurate setting.

It was once hoped by leaders in the hosiery industry that by this time the proposed standards of construction and inspection for full-fashioned hosiery would have been approved by the industry for promulgation by the U. S. Department of Commerce. These standards, recommended by the standardization committee of the National Association of Hosiery Manufacturers, have been before the industry in gradually improved form for almost two years, but opposition to the basic idea of grading hosiery has proved too strong to permit their official adoption.

But there are members of the association who are convinced that application of the standards would benefit the industry by raising the general level of hosiery quality, by preventing unfair comparisons of price between stockings of different quality, and by thus insuring a reward to the manufacturer who produces hosiery of high grade. The standards have been made publicly available to all those interested in them, in the hope—well-founded—that many of their provisions will receive gradual adoption as their value becomes appreciated. It is likely that this method of establishment will be far more effective in the case of the inspection standards, which class hosiery as firsts or irregulars on the basis of the size and location of defects, than in the case of the construction standards, which grade hosiery as Standard A, Standard B, and Sub-Standard on the basis of the number of courses contained, the number of flare narrowings, and the width of needle bar. Few manufacturers of low-grade hosiery, for example, will voluntarily stamp their stockings "Sub-Standard." Yet educational promotion will gradually bring buyers and sellers to talk in terms of the standards.

### *Knitting Rubber*

Since the knitting industry seems bound to make the greatest possible use of rubber yarns in its numerous products, machinery builders have had to get busy in the last year or so making their equipment capable of accommodating such yarns. In 1935 small hosiery-top ribbers were given new or modified laying-in devices, including one which knits in the covered-rubber yarn for a few needles at both the beginning and end of the lay-in portion to avoid later pulling in of the yarn. The automatic half-hose machine was made ready to lay rubber in its rib top, and the automatic women's seamless-hosiery machine was equipped for laying rubber in the welt. A jacquard latch-needle knitter was prepared for both laying in and knitting in for making patterned girdles.

The most interesting of the new rubber developments, however, was the method of knitting bare rubber in girdle

Customer: *"Your price is higher than Downstreet & Back's."*

Clerk: *"True, but our stockings are guaranteed to be Standard A, as defined by the National Association of Hosiery Manufacturers. That means they have been knitted with a full measure of silk and they will fit properly without undue strain on the threads."*

and other plain or jersey-stitch fabrics without the rubber showing. This invention resulted from the discovery that if a rubber yarn and a textile yarn are run into a fabric together, particularly if the rubber yarn is fed at the greater tension, the rubber pulls itself into the middle of the fabric and lies concealed between the needle wales and sinker wales. The concealment is aided by the fact that the pulling-in closes the loops of textile yarn. It also forces the textile loops to stand out to a certain extent on the face and back of the fabric in a sort of pile. The result is that a dense- and soft-surfaced fabric is obtained, and one example of this material is appropriately named Velv-o-flex. Such fabric is adaptable to napping on both sides, since the rubber, lying in the center of the cloth structure, is completely out of reach of the napper wire.

### *Increased Production*

An outstanding example of increased production in knitting machines is to be found in the warp knitters introduced to this country from abroad during 1935. One of these is a milanese machine which operates at 200 courses per minute in the case of a 120-Saxon-inch model and which can be assigned three to an operator. Another is also a milanese machine, and similar to the first except that it is equipped with two needle bars inclined toward each other for producing double or duplex fabric. An improved American-built tricot machine operates at 300 r.p.m. and 40 racks per hour, and it has given 90% efficiency when assigned seven per operative.

Another increase in the production of knitting machines made during the year was by the application of two feeds to the seamless hosiery machine which turns and knits in the welt. Since, with this extra feed, every other course in the stocking is knitted from a different yarn package, irregularities in the yarn are less evident in the completed hose and a "ringless" effect is secured. Incidentally, at least one seamless mill is making a three-yarn ringless hose on an attachment of its own devising. This is the H.R.H. Silk Hosiery Mills, Inc., Moberly, Mo. A patent on a device for the same purpose has been applied for by Paul Krenkel and assigned to the Textile Patents Corp., Philadelphia, Pa.

Increased production was sought also by the application of flexible yarn carriers to full-fashioned hosiery machines, these permitting more rapid plating and higher production at the footer. These carriers, which are designed like coiled springs, are also claimed to permit easy replacement of tubes, prevent damage to sinkers, and permit easy passage of knots and high-twist yarns. They are particularly suited to split work, as they can be set low between the sinkers to prevent looping of ends and thus eliminate menders, since the cotton and silk will not lap together.

In this matter of split-foot full-fashioned hosiery, it is interesting to note that the handicap to the development of this type of knitting afforded by the three-carrier development is being overcome, with the result that at least one mill is now producing split-sole ringless and the machine builders are prepared to supply the necessary attachments.

Good examples of increased automaticity in knitting machinery are found in the new hockey-cap or shaker-cap machines. These begin by knitting one fabric on the cylinder and one simultaneously on the dial, later joining the two automatically on one set of needles and continuing to knit the single crown fabric. All that is necessary to complete the cap after it is removed from the machine is to gather it in at the top. One 8-in. model is equipped with a two-color striper for the welt, and it will produce 35 doz. caps per 8-hr. day.

### *Miscellaneous Developments*

Four new or improved attachments were applied to full-fashioned hosiery machines during the year. Improvements in the lever-type friction box for three-carrier knitting include more rigid carrier-rod driving members, safety feature to prevent breakage of parts in case of improper operation, positive lay-out lever consisting of plunger and eccentric pin to lock lever either in operating or laid-out position, and increased visibility between friction box and carrier rods. A half-speed shock absorber reduces carrier-rod shock by causing the main carriers to travel at half speed during the latter part of their movement, and minimizes pressure on the friction boxes. A water-cooled friction shaft for continuous high-speed operation has water of thermostatically controlled temperature pumped through it. An improved splicing device for use in splicing friction boxes eliminates the necessity for extremely tight splicing and results in less wear on carrier nuts and spindles and increased life of machines.

A new design of full-fashioned foot was introduced during the year by Berkshire. The heel is deeper and more cuplike to give a better grip. The narrowing stitches for the sole are right in the arch of the sole, where the foot is narrowest. New reinforcement is added at the side front to cover the friction-creating toe joints.

Other 1935 developments of interest to the knitting trade include the adaptation of automatic half-hose machines to the knitting of terry fabric, a general refinement and increased patterning capacity of links-and-links machines, the introduction of a simplified jack press for leaded spring-needle machines and also a bur holder with micrometer stitch adjustment, and the announcement of a high-speed Lamb-type fingering machine (220 r.p.m.). Still other developments include a special hosiery spring needle with short groove to resist corrosion and provide strength, several mechanically improved sewing machines, and a tensile-strength tester especially designed for elastic yarns. A new hosiery-inspecting machine employs mirrors to render rotating of the form needless.

The distensibility, recoverability, and stretch-endurability of stockings are determined by one of two new hosiery-testing machines. The other, which subjects the heels and toes to the action of an abrasive material mounted on an oscillating device, shows wear-resistance.

# PRACTICAL HELPS for Knitting Overseers

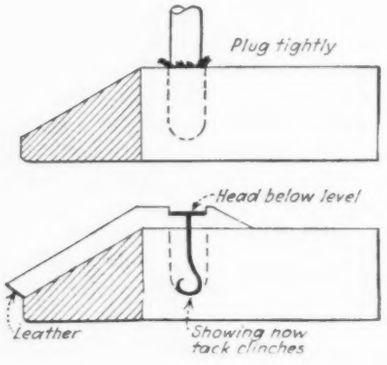
HOLES IN knitted outerwear can be traced and minimized by a system which requires the operative to mark the holes with a piece of string of contrasting color, and to mark the location of each hole on the edge of the cylinder plate with a piece of chalk when they occur frequently. Later an inspector should count the defects and make note of any holes not marked by the knitter.

▼

WHEN YARN is coned for latch-needle knitting, the gainer should be so adjusted that the adjacent courses of yarn are well spaced and the size of the cone is not too large.

▼

WITH THE leaded-type spring needles, the tacks holding the leath-



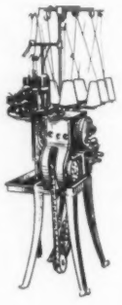

ers on the cylinder blocks may become loose. To overcome the difficulty, first drive a plug of hardwood into the tack hole, and then substitute a 4-oz. shoe tack for the usual cut or carpet tack.

▼

STREAKS IN the tuck-stitch section of napped tubular knit goods constructed with both plain and tuck stitches can by overcome by: (1) running the cloth through the napping machine under tension, so as to flatten it out against the rollers; (2) running the cloth over a straight-edge, similar to the arrangement in a a shearing machine.

▼

INSTEAD OF changing the stitch when knitting seamless hose, keep



the machines clean and the stitch will not change. Every mill should have an air compressor capable of maintaining 100 lb. pressure for cleaning machines. In large mills, an ideal arrangement is to have an exhaust system to take care of the flyings.

▼

BOTTLE BOBBINS used for seamless hosiery should not be over 13 in. high, since, when running off the last of the bobbin, the yarn drags on the spindle if taller ones are used. If the bobbins vary, it is a good plan to sort them out according to size, mark those alike with a dab of paint at the top of the spindle, and always use on a winder that is adjusted to them.

▼

MANY KNITTERS find that they can keep their circular machines fairly free from lint by the use of a good, high-grade needle oil, applying it to the needles by means of a brush or spray two or three times a day. The needles are oiled just before a cut is to be taken off, and the oil-soaked portion of the fabric is discarded.

▼

IN SOAKING silk for three-carrier knitting, potassium carbonate or pearl ash has been found to produce a particularly soft silk. For direct knitting, the amount should range from 1 to 2½ lb. per bale of silk, and for box conditioning from 8 oz. to 1 lb. should be used, the quantity being in inverse proportion to the humidity.

▼

CREASES ARE often encountered in the manufacture of 10-thread full-fashioned hosiery and are due to "crowded" silk. The remedy is to use a machine of coarser gage or a silk of smaller size.

▼

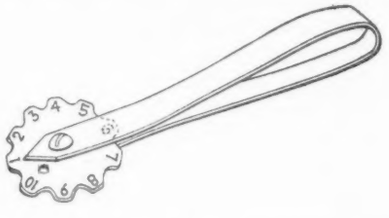
KEEPING ONE legger's work on full-fashioned hosiery in a 10-doz. set, and issuing it to one footer, makes the work more uniform; and if the 10-doz. set is sent out in one dye lot, it will give a better yield for the finishing department, as the goods can be paired better and the work will match up easier.

▼

WHERE THERE are several different types of stop-motions in a mill with fine-gage underwear machines, an effort should be made to have the same type on all machines of the same size, in order to secure greater uniformity of tension in knitting.

▼

THE LINK METER illustrated is handy for those who have to make long pattern chains. For the ordinary full-fashioned chain, the outside diameter of the wheel should be about 1 9/16 in. The teeth bear the same numbers on both sides, and the meter



can be used in either direction, since one side reads clockwise and the other counter-clockwise.

▼

MILANESE IS particularly susceptible to creasing during the scouring and dyeing processes. The fabric should be opened out as much as possible while it passes over the reel by an operative provided with rubber gloves.

These items were culled from the 1935 issues of TEXTILE WORLD.

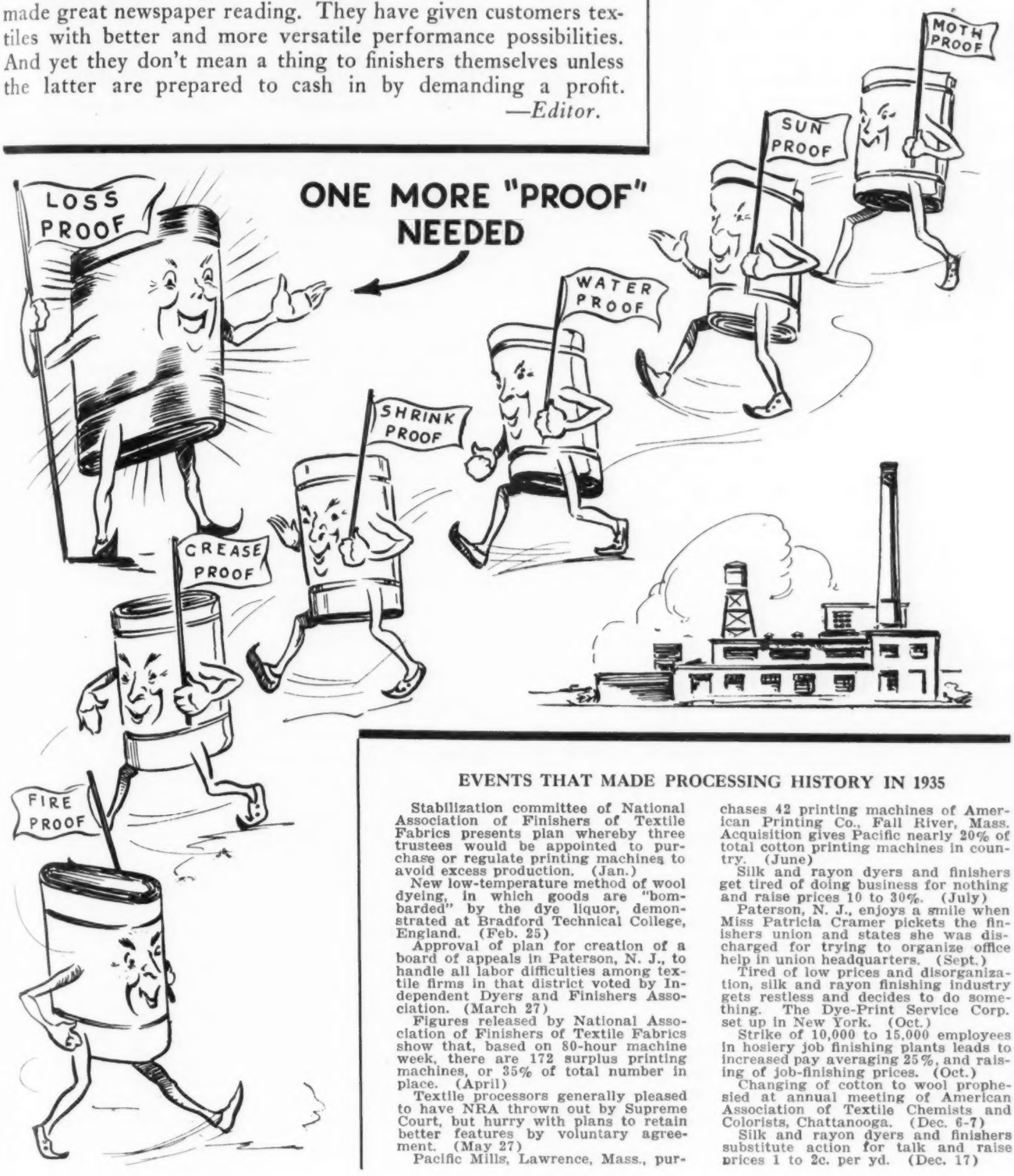
# PROCESSING SECTION

A CRAZY NOTION has come into our head and we just can't seem to get rid of it. It's the fantastic idea that the finishing industry might make a profit in 1936. We realize it's against all precedent—and possibly in defiance of all economic laws—but the hunch still persists.

It's based of course on a few signs of sanity in the latter part of 1935 and the early days of 1936: a sort of awakening of the thought that prices might be raised to cover additional cost burdens. That's a start—and might even lead into curiosity as to actual profits.

If it does, the industry might begin to capitalize on the many new technical developments of the last few years. These have made great newspaper reading. They have given customers textiles with better and more versatile performance possibilities. And yet they don't mean a thing to finishers themselves unless the latter are prepared to cash in by demanding a profit.

—*Editor.*




## EVENTS THAT MADE PROCESSING HISTORY IN 1935

Stabilization committee of National Association of Finishers of Textile Fabrics presents plan whereby three trustees would be appointed to purchase or regulate printing machines to avoid excess production. (Jan.)

New low-temperature method of wool dyeing, in which goods are "bombarded" by the dye liquor, demonstrated at Bradford Technical College, England. (Feb. 25)

Approval of plan for creation of a board of appeals in Paterson, N. J., to handle all labor difficulties among textile firms in that district voted by Independent Dyers and Finishers Association. (March 27)

Figures released by National Association of Finishers of Textile Fabrics show that, based on 80-hour machine week, there are 172 surplus printing machines, or 35% of total number in place. (April)

Textile processors generally pleased to have NRA thrown out by Supreme Court, but hurry with plans to retain better features by voluntary agreement. (May 27)

Pacific Mills, Lawrence, Mass., purchases 42 printing machines of American Printing Co., Fall River, Mass. Acquisition gives Pacific nearly 20% of total cotton printing machines in country. (June)

Silk and rayon dyers and finishers get tired of doing business for nothing and raise prices 10 to 30%. (July)

Paterson, N. J., enjoys a smile when Miss Patricia Cramer pickets the finishers union and states she was discharged for trying to organize office help in union headquarters. (Sept.)

Tired of low prices and disorganization, silk and rayon finishing industry gets restless and decides to do something. The Dye-Print Service Corp. set up in New York. (Oct.)

Strike of 10,000 to 15,000 employees in hosiery job finishing plants leads to increased pay averaging 25%, and raising of job-finishing prices. (Oct.)

Changing of cotton to wool prophesied at annual meeting of American Association of Textile Chemists and Colorists, Chattanooga. (Dec. 6-7)

Silk and rayon dyers and finishers substitute action for talk and raise prices 1 to 2c. per yd. (Dec. 17)

# ECONOMIC DEVELOPMENTS

## *in processing industry give promise of profits in 1936*

ONCE again in 1935 we have witnessed the paradox of an industry operating at approximately its normal rate but failing to make a profit. At times it almost has appeared that the finishers enjoy this gratuitous method of doing business. That this is not true is evidenced by the fact that in the last few months both the cotton and the silk and rayon divisions have taken vigorous steps toward a profit-making basis. In reviewing the major economic developments of the year, we shall, therefore, stress the measures which have been proposed or adopted with that end in view.

At the beginning of 1935, the most immediate problems which faced textile processors were due to overlapping of code authority. In many instances, individual companies handling various classes of materials were governed by two or more codes. Then, with the sudden end of N.R.A. those problems were erased from the board. After a brief moment of exultation at being freed from governmental control, leaders in the industry came quickly to the realization that a return to the chaotic conditions which prevailed prior to the enactment of the Recovery Act would be disastrous. Accordingly voluntary agreements were made to retain the beneficial features of N.R.A., and, as a result, there has been quite general adherence to the wage and hours-of-labor provisions of the several codes.

### *Labor Relations*

No serious labor difficulties have confronted the industry since the settlement in December, 1934, of the strike in the silk and rayon finishing division which paralyzed practically every dyeing and printing plant in northern New Jersey, New York City, and Long Island. As was pointed out in this review last year, interruption of production because of labor troubles has been all too frequent in the Paterson area, and a number of mill owners moved their plants to other localities, while others seriously contemplated the feasibility of following suit. Thus far, however, the exodus has not been nearly as extensive as appeared probable twelve months ago.

A few sporadic walkouts have occurred in various branches of the industry, but these, for the most part, were settled quickly. A strike for higher wages, shorter working hours, better working conditions, and union recognition in plants engaged in job finishing of hosiery was called on October 18 and was ended around the middle of November after practically all of the companies affected had signed separate agreements with the American Federation of Hosiery Workers. An unusual feature of this dispute was the fact that the strikers had the moral, if not active, support of full-fashioned hosiery manufacturers who do their own dyeing and who had been harassed by progressive price-cutting by job finishers. Net results of the strike were increases in pay averaging about 25% and raising of job finishing prices from a low of 45c. a dozen to 60 and 70c. a dozen, as compared to a finishing cost of 90c. to $1 a dozen in mills having their own dyehouses.

### *Sales of Domestic Coal-Tar Dyes*

| *Year* | *Lb.* | *Year* | *Lb.* |
|---|---|---|---|
| 1927.. | 98,339,000 | 1932.. | 73,591,000 |
| 1928.. | 98,303,000 | 1933.. | 98,229,000 |
| 1929.. | 106,071,000 | 1934.. | 84,309,000 |
| 1930.. | 89,972,000 | 1935.. | *89,000,000 |
| 1931.. | 85,220,000 | | |

*TEXTILE WORLD *estimate*

Provisions of the National Labor Relations Act (Wagner bill) were far from pleasing to cotton finishers, and in March they filed a brief with the Senate committee on Education and Labor in which they attacked the constitutionality of the act on several grounds.

### *Liquidations and Reorganizations*

Closing of the American Printing Co. plant and acquisition by Pacific Mills of the merchandising of M.C.D. Borden & Sons, Inc., textiles, were reported in our review last year. The plans of the Bordens to reorganize the American Printing Co. as a job finishing plant were abandoned and the equipment was offered for sale. Some of this machinery was purchased by Mexican interests and shipped to Vera Cruz, and a considerable amount was acquired by other plants, both in this country and in South America. The 42 printing machines, together with about one-third of the remaining equipment, were acquired by Pacific Mills and transferred to that company's Lawrence, Mass., plant. This purchase, plus the machines already located at Lawrence and at Lyman, S. C., gives Pacific nearly 20% of the total number of cotton printing machines in this country. Pacific's move in taking this equipment off the market prevented its purchase by numerous small companies, a potentiality which had threatened the industry with the prospect of cut-throat competition beyond that which has prevailed in the past. Other changes of particular interest are liquidation of Lyons Piece Dye Works, Paterson, N. J.; decision of United States Finishing Co. to close its Pawtucket, R. I. plant and to transfer the equipment to the Norwich, Conn. plant; and organization of Palmetto Print Works to be located at Greenville, S. C., and to be operated by Union Bleachery of that city, and Aspinook Co., Jewett City, Conn.

Another trend is the acceptance by a considerable number of finishers of the opportunity to reorganize under Section 77-B of the Federal Bankruptcy Act. It is problematical whether such reorganization will allow companies which have depleted their resources and have exhausted their borrowing capacity to get back on a sound footing or whether it will only postpone their demise.

Production in 1935 by cotton finishers showed an increase of 6.2% over the previous year, and was about on a par with the 1923-25 average; a gain of 4% for bleached fabrics and of about 22% for dyed fabrics was counter-

balanced somewhat by a loss of 4% for prints. No official figures are available on activity in the silk and rayon division, but TEXTILE WORLD estimates total production at 440,000,000 yd. in 1935, as compared with 406,000,000 yd. in 1934 and 474,000,000 yd. in 1933.

One of the chief reasons that few companies have been able to make a profit in recent years is the grossly excessive productive capacity of the industry, which has led to price cutting and other forms of destructive competition. A good idea as to the surplus capacity in the cotton printing industry in 1935 can be had from Fig. 2. This chart, which is somewhat similar to one prepared by the National Association of Finishers of Textile Fabrics covering the year 1934, is based on a production of 1,200 yd. per machine hour and an 80-hour week. The deduction made by the association is that, allowing 25% surplus capacity to absorb irregularities and to assure competition for the full amount of yardage offered, there is a surplus of 172 cotton printing machines or 35% of the total number in place. To relieve this condition, the association recommended in January, 1935, that a reasonable number of printing machines be purchased or otherwise regulated by trustees appointed by the cotton printers, funds for the adminstration of the trust to be obtained by an assessment of not more than ¼c. per yard on goods printed. Although operators of a preponderance of the cotton printing machines assented to this plan in principle when it was first proposed, and no better one has been suggested, no definite action has been taken on it as yet.

The Institute of Dyers & Printers has not been active since the Recovery Act was voided, but several moves have been made toward stabilization of the silk and rayon finishing industry. One of these was the formation in October of a credit organization, composed of some 25 dyers and about the same number of chemical supply houses, which is to function as a trustee, collecting accounts due to the dyers from their customers and from these collections paying the suppliers the amounts due them for dyes and chemicals. Another move reported in October is arrangement between some five or six of the largest finishers for the group buying of dyes, chemicals, and equipment. Still another was the formation of the Dye-Print Service Corp.; the aim of this group is stated to be the establishment and promotion of better competitive conditions in the industry; details of its program have not been made public.

In mid-December silk and rayon finishers increased prices, and a few days later announced a price protection plan which they are offering their customers. This takes the form of an agreement which provides that in the event the finisher accepts from the customer an order for a given construction at a price lower than the Dec. 17 level, he will credit the customer the amount of such reduction on each yard of goods of that construction ordered by the customer subsequent to Dec. 17. The agreement is subject to the proviso that after Dec. 31, the customer gives no orders to finishers who have not granted similar guarantees.

## *Increased Costs*

Increased costs resulting from the operation of new Federal and State laws—the National Security Act especially—prompted cotton finishers to add a surcharge of 1½% of the total of each bill rendered on orders received on and after Jan. 1, 1936. Although this plan met with considerable opposition on the part of the converters, the finishers preserved an almost unbroken front, and at this writing there is every indication that the latter will succeed in their attempts to collect the surcharge.

A few finishers have been able to make a profit year after year. There is always the possibility that other individual companies through their own efforts can get into the black. But for the industry as a whole to get on a profit-making basis, either a sizable increase in volume of business (with a corresponding decrease in overhead costs) or higher prices than have prevailed in the past are necessary. Unable to foresee any great increase in volume for 1936, the finishers have begun to take steps toward obtaining prices which will insure a reasonable profit.

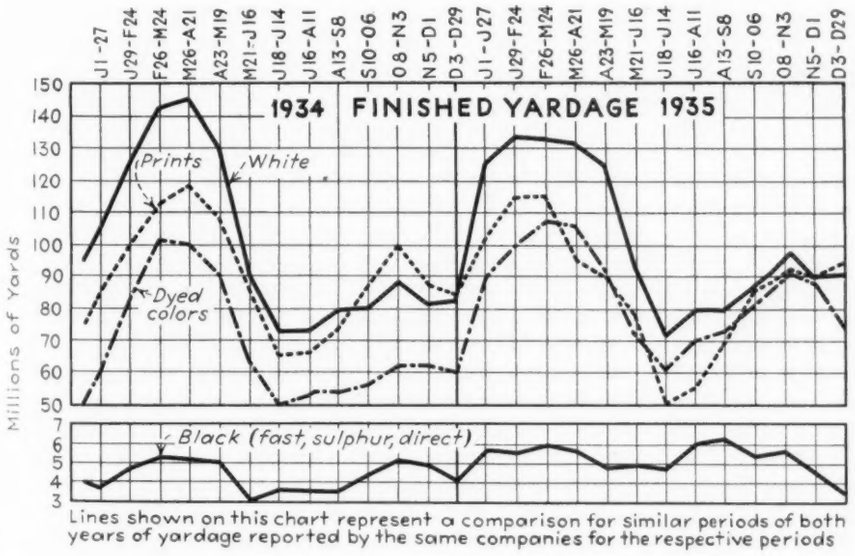



*Fig. 1. COTTON FINISHING ACTIVITY. Data from National Association of Finishers of Textile Fabrics. Volume processed by reporting companies was 3,759,365,113 yd. in 1935, as compared with 3,538,572,191 yd. in 1934. Total volume processed by cotton finishers in 1935 is estimated at 4,160,000,000 yd. against a known volume of 3,871,632,000 yd. in 1934. Comparable figures are not available for previous years.* TEXTILE WORLD'S *estimate is 4,400,000,000 yd. in 1933, 4,700,000,000 yd. in 1929, and 4,100,000,000 yd. for the 1923-25 average.*

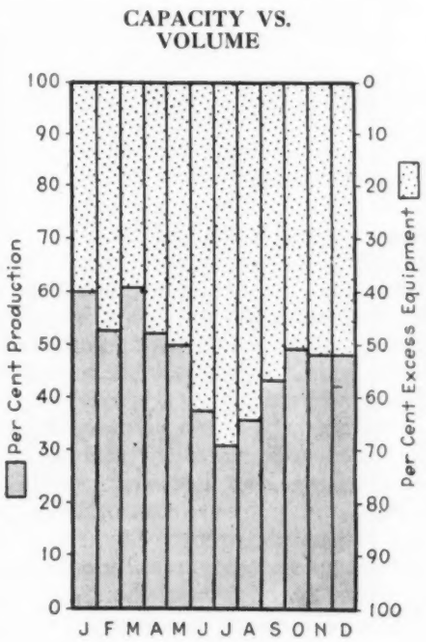



*Fig. 2. COMPARISON OF VOLUME of products and total cotton printing machine capacity in 1935.*

# TECHNICAL ADVANCES

## *In textile processing follow development of new methods, chemicals, and equipment*

IN DECEMBER, at a meeting of textile chemists, the prediction was made—and was not questioned—that in the near future it will be possible to transform cotton into wool, rayon into silk, that starting, say, with cotton, it will be possible to create an entirely new textile having all the advantages of rayon with none of its disadvantages. Already it is possible to impart some of the anti-creasing properties of wool to cotton, the appearance of silk to rayon, the moth-resistance of the vegetable fibers to the animal fibers. Two years ago in reviewing the advances in textile processing, we emphasized the important part played by the development of new dyes and chemicals. This year we are particularly impressed by the progress which has been made in the application of these products. At the same time, improvements in equipment have been effected which aid the textile processor in obtaining better results.

Holding the center of the stage at present are the synthetic resins. During the last twelve months there has been a notable increase in the use of these compounds for imparting a crush-resistant finish to cotton and rayon and for producing waterproof and gas-tight fabrics. More recent applications are to reduce the susceptibility to slippage of rayon fabrics and to increase the resistance to abrasion of various types of piece goods. Application of synthetic resins in textile processing is in its infancy, and further developments appear certain.

### *New Processes*

Use of moth-proofing compounds has been adopted extensively by manufacturers of wool goods, carpets, and rugs, and a number of new chemicals for that purpose have made their appearance. Late in 1934 details were made public of the process developed by the British Wool Industries Research Association for rendering wool unshrinkable. At last report, this process, which comprises a treatment of the wool with gaseous chlorine or bromine, had not been fully perfected for commercial use. A new low-temperature method of wool dyeing in which the goods are treated in a turbulent dyebath attained by bubbling compressed air into the liquor was announced last February by technicians of the British Dyestuffs Corp. Advantages claimed for this method are that it is less detrimental to the wool than is dyeing at the boil and that it permits use on felt and other thick fabrics of fast colors hitherto unsuitable because of their poor penetrating properties.

Processing of cotton yarn and fabrics with a recently developed cuprammonium solution has been found to impart a deep-set lustrous appearance quite different from that given by mercerizing and to increase the toughness and tensile strength of the cotton. The method is now being used commercially on woven fabrics and experiments are being carried out on yarns and knit goods. One possibility which is being investigated is the application of the cuprammonium solution in the treatment of tire cords.

Latex has failed to find as general use in the cotton finishing industry as was anticipated; but, on the other hand, it has found marked favor as a backing for pile fabrics and in many special applications. Investigation by the National Bureau of Standards of sweet potato starch has disclosed that this material can be used satisfactorily for the sizing of cotton warps, and this type of starch has been made commercially available through the efforts of the U. S. Department of Agriculture.

Improvements in sulphur dyeing include the use of sodium hydrosulphite and caustic or sodium bisulphite and caustic in addition to sodium sulphide in the application of leuco types of sulphur blues, use of organic reducing agents with certain dyes, and use of ammonium sulphate and sodium bisulphite as exhausting agents. In vat dyeing, development with a fatty alcohol sulphate, instead of soap, is said to give increased fastness to light with many dyes; laboratory tests indicate that the brightest and deepest shades and best light fastness can be obtained by simultaneous oxidation and development, and attempts are now being made to devise a practical method for accomplishing this simultaneous treatment.

### *Dyes and Chemicals*

Of the 25 or more new chemicals which have been announced during the year, the one which apparently has the greatest potentialities in trimethyl benzyl ammonium hydroxide; said to be the first true solvent for cellulose. This compound not only may effect marked changes in rayon manufacturing technique, but also should find many applications in textile processing. A derivative of this compound is available, for example, for imparting a permanent finish to cotton fabrics.

That we are soon to witness many new developments in the surface coating of textiles is made evident by the introduction of a variety of compounds suitable for that purpose. Among these are: (1) sucrose octa acetate, a cane-sugar derivative, which yields a glossy, water-repellent surface and which also can be used in conjunction with cellulose acetate, nitrocellulose, various lacquers, etc.; (2) a 7% solution of sodium hydroxide containing 8% of a cellulose derivative, the solids of which are precipitated by water, acids, and acid salts to give a sizing or stiffening which is not removed by repeated laundering; and (3) ethyl cellulose and cellulose nitroacetate lacquers which yield various new types of coatings.

Other innovations in chemicals include sodium sesquisilicate, a new alkaline detergent; a series of synthetic aliphatic alcohol sulphates used as wetting and penetrating agents; a range of organic alkalis, typical of which is ethylene diamine, a solvent for naphthol dyes, and (with copper hydroxide) cellulose; a special sulphonated mineral oil for soaking tram silk; a fire retardant of the glyceryl borate type; sodium chrom glucosate, an alkaline organic chromate for control of corrosion in brine, condenser, and other aqueous systems; an improved high-exchange zeolite for use in water softeners; and a number of new wetting agents and detergents of the sulphonated and alkylated types. Several new water repellents, delustrants, flame-proofing compounds, and degum-

ning agents made their appearance, as well as new wool-scouring compounds, one of which is based on the theory that nascent soap has a more vigorous detergent action than ordinary soap.

Well over 100 new dyes made their appearance in 1935, including a new range of dustless, colloidalized vat colors in powder form developed especially for the printing trade. Last month announcement was made of the development in England of a new class of dyes soluble in water, and having a direct affinity for cellulose acetate. Also introduced last year was a new line of 64 certified throwsters tints, comprising 40 for silk and 24 for rayon yarns.

Development of new chemicals and new finishes calls for tests and apparatus which were not essential a few years ago. Among the newer tests which help to fill these needs is a method for the determination of residual sulphuric acid in wool, a simple procedure for distinguishing between sulphonated oils and liquid soaps, a rapid test for silica in peroxide solutions, a revised method for the identification of various types of synthetic yarns, and a new method of analyzing textiles containing a mixture of fibers. New apparatus introduced during the year includes a fabric-wear testing machine, a device for testing the susceptibility to shrinking of fabrics upon dry-cleaning, a pH meter for making hydrogen-ion determinations, and a comparitor for checking the pliability of fabrics.

### *Equipment Developments*

Machine developments were much more numerous last year than the year before. These, however, were largely in the nature of improvements and adaptations of previous types, designed to increase production or to give better quality of work. The trend toward increased speed is exemplified by a two-flame singer permitting cloth speeds up to 300 yd. per minute, a duplex sewing and rolling machine designed to handle 150,000 yd. of cloth in 40 hours, a steaming and finishing machine for handling tubular knit goods at speeds up to 45 yd. per minute, and an improved single-package extractor with output of 400 spools per hour for 16-unit battery.

Featuring improvement in quality are three stainless metal dyeing machines—one for raw stock, one for packages, and one for silk and rayon fabrics; an individual-drive jig; a continuous cloth carbonizer with automatic control of temperatures and strength of acid; a cloth washer designed to eliminate washer wrinkles and to effect savings in time, hot water and soap; two improved skein dryers—one with a traveling skein protector, and the other with all surfaces exposed to moisture constructed of aluminum or aluminum alloy; a fabric conditioning machine designed particularly for rayon fabrics; an improved cooling and conditioning machine for restoring the natural moisture content to piece goods; a ball- and roller-bearing calender for producing a high-grade finish on broadcloth and other shirting fabrics; and two shears—each embodying radical changes in design from older models. Three or four other developments of particular interest are a device which permits delivery of fabrics from dryers, conditioners, etc., at any predetermined weight; a tenter dryer said to reduce operating costs as much as 50%, as compared with older models; and an improved automatic machine designed to cut tublar or flat fabrics in any desired lengths.

Research on problems connected with textile processing has disclosed some interesting and valuable information. Investigations at Boyce Thompson Institute have shown that the cotton fiber is not a homogeneous substance, but is composed of a combination of cellulose particles and a non-cellulosic pectic material. Studies at Texas Agricultural Experiment Station indicate that, while all dyed fabrics change shade upon exposure to sunlight, it is not impossible to obtain dyeings which withstand 100 hours of exposure before fading is perceptible. Work carried out at the National Bureau of Standards by research fellows of the A.A.T.C.C. has thrown new light on the chemistry of wool and the action on the wool fiber of alkalis, oxidizing agents, and other chemicals. An investigation at the United States Testing Co. has shown that two-tone dyeings in silk hosiery are due to differences in the shape and size of silk filaments in adjoining sections of the fabric, and that by proper grading of raw silk and correct routing of 10-bale lots in throwing, one can use about two-thirds of all lots with nearly complete elimination of inherent two-tone dyeing. Other work at the Bureau of Standards has disclosed the effect of various dyeing and finishing procedures on the durability of silk hosiery. Research projects inaugurated during the year include the studies on warp sizing and rayon crepage mentioned in the rayon section of this issue and a study of the mercerizing process which has been started by an A.A.T.C.C. research fellow, stationed at the University of Chattanooga.

The important part that the chemist has played in the developments of recent years is apparent. He is again making his services indispensable to any textile processing plant. Many executives have recognized that installation of modern laboratories and employment of able technicians pays dividends. Thus continued and even greater progress is assured.

*SYNTHETIC RESINS—employed for several years in making a variety of molded products—now find use in producing many new types of finishes on textile fabrics.*

# PRACTICAL HELPS for Processing Overseers

PIN RACKS or traverse motions should be kept in condition and used regularly to prevent bleach-house rolls from being worn in grooves. Hot bearings will heat the shell body and may cause loosening of the rubber.

▼

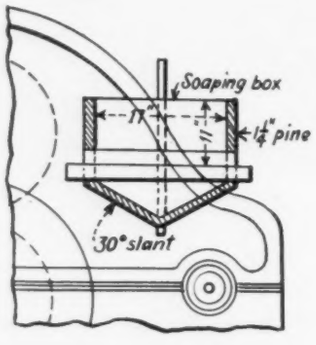
PREMATURE OXIDATION of knit goods and other fabrics which are dyed with vat colors on a reel-type machine, can be reduced somewhat by setting the reel very close to the surface of the dyebath.

▼

A SLIGHT saponification of the acetate yarn previous to dyeing permits good results to be achieved in dyeing cotton-acetate fabrics with aniline black on a continuous machine.

▼

A SOAPING BOX, which permits uniform application of the fulling solution, can be built into the mill just over the whip roll. The box is di-



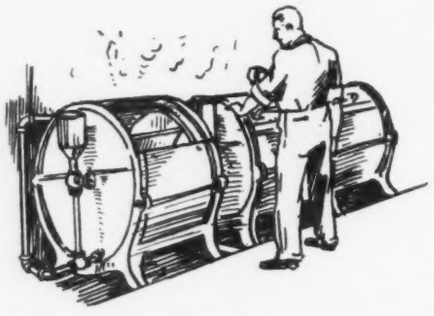

vided into two equal sections, so that each side carries its proper amount of solution independently. The operative fills the box and pulls the plugs after the mill has run a few turns to take out the tangles. If the mill ties up and knocks off before all the solution is run in, the operative can replace the plugs.

▼

ONE OF the new detergents which are resistant to acids should be employed for scouring any knit goods that contain residual acid; otherwise the acid will break down the soap deposited on the fibers during scouring and form fatty acids, which will become rancid when inclosed in packing boxes.

▼

TO AVOID so-called "reduction" when dyeing hosiery with Sulphon Cyanine Black B by the single-bath method, try a modification. Bring the water to a boil, add the degumming agent, enter the goods, and run for 20 min. with the lids closed; open



the lids and allow the bath to cool to 205° F.; add the dye and run for 20 min.; add the salt and continue with the lids open and the temperature maintained at 205° F.

▼

USE OF the same wooden machine for dyeing both cotton and rayon knit goods should be avoided. Even if the tub is boiled out well after dyeing the rayon cloth, some of the lubricating oil used on rayon yarn may be present and cause "soapballs" on the cotton fabric.

▼

A GLASS U-tube, inserted by means of a cork in a hole bored in the side of a mangle box at a suitable level will indicate the height of the liquor when certain wetting agents are employed which cause so much frothing that the surface of the liquor is obscured.

▼

WATER ADHERING to mercerizer clips dilutes the caustic soda and makes the selvage absorb color to a lesser extent than the rest of the fabric. A jet of compressed air blowing on the clips as they return from the remote end of the machine, after they have passed through the wash spray, will remove the excess water.

▼

LEVEL DYEING of cotton raw stock is assisted by a preliminary

treatment. For 1,000 lb., of cotton already loaded, make up a short bath of water, to which add 4 qt. of pine oil, 4 qt. denatured alcohol, and 8 qt. of 50% sulphonated oil, previously mixed together. Start bath cold, bring to 150° F., run for 30 min., add sufficient cold water to bring the bath up to volume, and continue with the usual dyeing operation.

▼

USE OF dyes sensitive to sulphur dioxide fumes will cause spots to appear on silk hosiery which is exposed to the air in a damp condition. To test dyes, wet a dyed swatch with a very dilute solution of soda ash, hang it while damp in a bell jar in which a small piece of sulphur is set burning, leave for 12 hours, rinse, wring, and dry. Spots indicate that the dye is sensitive to sulphur dioxide.

▼

BRIGHT SHADES, similar to those obtained from basic dyes, can be secured on cotton by first mordanting in the usual manner with a sulphurized phenol mordant, and then dyeing with an acid dye in a hot liquor. The method is used when better penetration is desired than can be obtained with basic dyes.

▼

A STEAM REDUCING valve will often eliminate yellowing of the fabric, scorching of the cloth, and other defects that appear when steaming wool goods on a crabbing machine. The pressure should never be higher than 15 lb. per sq.in., and 7 to 9 lb. will be found satisfactory.

These items were culled from the 1935 issues of TEXTILE WORLD.

# ENGINEERING SECTION

DURING THE DEPRESSION, of course, a considerable amount of power plant and other engineering equipment stood idle. As improved business made it necessary to put this into service again, engineering departments often had shocks coming to them. They learned, if they didn't already know it, that much of this machinery was obsolete—some not even usable—and that it must be replaced if the plant was to be put on an efficient basis. This then is the first job for the plant engineer in 1936: to strive for the modernization of the equipment which comes under his jurisdiction.

His second job is to inaugurate—or perfect, if he already has one—a system for checking on lubricants, fuels, drives, power-plant efficiency, etc., etc. The number of mills where practically no systematic investigation and control of this type exists, is shocking. It represents a fertile field, and promises dividends.—*Editor.*

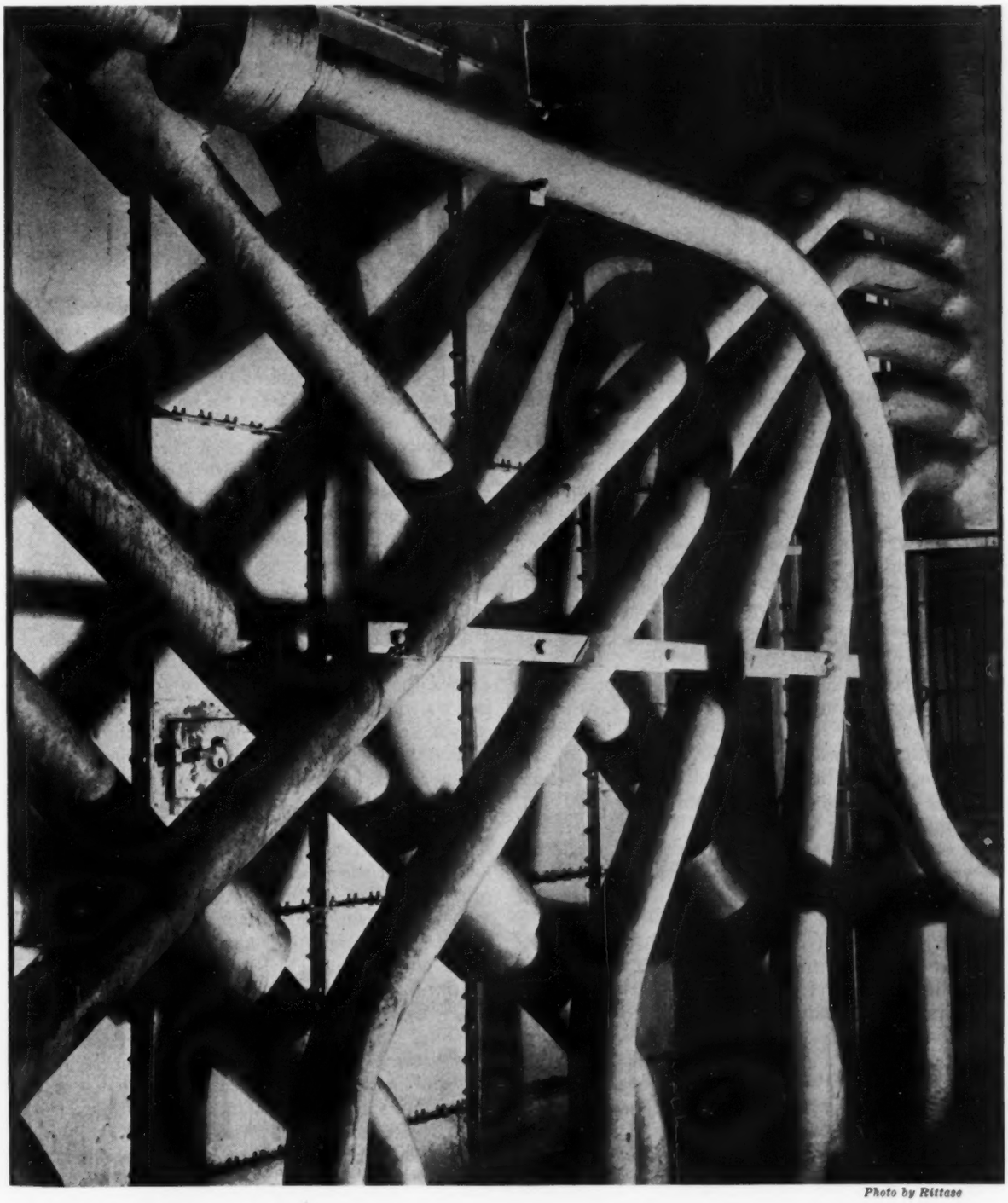


*Photo by Rittase*

Engineering

# ENGINEERING ADAVNCES

## *Point way to higher efficiencies in power plant and mill*

GREATLY increased demand during the latter half of 1935 for textile products, particularly those of woolen and worsted mills, has necessitated the calling back into service of all classes of machinery and equipment, both engineering and manufacturing. As a result, the textile plant engineer has had his time taken up with the work of getting into operating condition equipment which has not been used for some years. Consequently, he has had but little opportunity for investigating or installing new machines. Now that the plant engineer has got his second wind, he realizes that much of this equipment which has been standing idle is no longer modern, efficient, or even usable, and he is becoming greatly interested, therefore, in new developments which have occurred during the last year. When the engineer has collected the necessary information and cost data, he will be ready to inform the executives of his company that they must spend some money if they are to make the plant up-to-date and efficient.

### *Steam Generation*

Two developments of the year are designed to improve operation of the underfeed stoker. While these are not yet fully perfected, although in full-scale operation, present difficulties will no doubt be overcome. The first innovation is zoned air supply and control, in which the stoker is divided into three zones from front to back, and each zone is divided into sections across the stoker, one section extending from the center of one line of tuyeres to the center of the next line, and so on. Indicating instruments show the fireman at all times just how much the various dampers are open and just how much air is being supplied to each zone, and any local unbalancing of the air supply or fuel bed can be instantly corrected. In one installation a 25% increase in fuel burned per square foot of grate surface was obtained.

The other new development is the water-cooled fuel bed, in which water-circulating pipes are laid on the top of each row of tuyeres and down over the extension grates. The water pipes or tubes are connected to the circulation system of the water-cooled furnace walls. Less power is required to move the coal on the fuel bed, due to the mass being more open and porous. In addition, a better circulation of air is obtained. This development was brought about by the desire to utilize the mid-continent, low-ash-fusion-point coals which give trouble on the usual type of stoker.

A booklet recently distributed by the Chemical Founation entitled "The Deserted Village—No. 6" should be read by all users of oil fuel, and particularly by those who are considering changing from coal to oil. The subject discussed is the possibility of a petroleum shortage in the near future, and the final conclusion is drawn that within 5 to 8 years there will be a shortage which will cause an increase in price. As opposed to this threatened shortage, it has been reported to the Petroleum Institute that by the polymerization of natural gas and waste refinery gasses some 110,000,000 bbl. of motor fuel alone can be produced, or about 25% of present consumption. Such a production would render available larger amounts of fuel oil by lessening the amounts of motor fuel to be produced by cracking and hydrogenation. Distillation of oil from oil shales and the hydrogenation of bituminous coal are being cited as reserves to offset any threatened exhaustion of natural oil fields. It is not within the power of this reviewer to pass upon these opposing assertions, but he feels it necessary to call attention to the drain that is being made on our oil reserves and to the problems connected therewith which may come up in the not far distant future.

It has been generally believed that caustic embrittlement in boilers is caused solely by the caustic soda in the water. At the December meeting of the American Society of Mechanical Engineers the startling announcement was made that recent experiments indicate the presence of silicate also is needed to bring about the embrittlement action. It was still found, however, that maintenance of the proper sulphate-carbonate ratio prevents embrittlement.

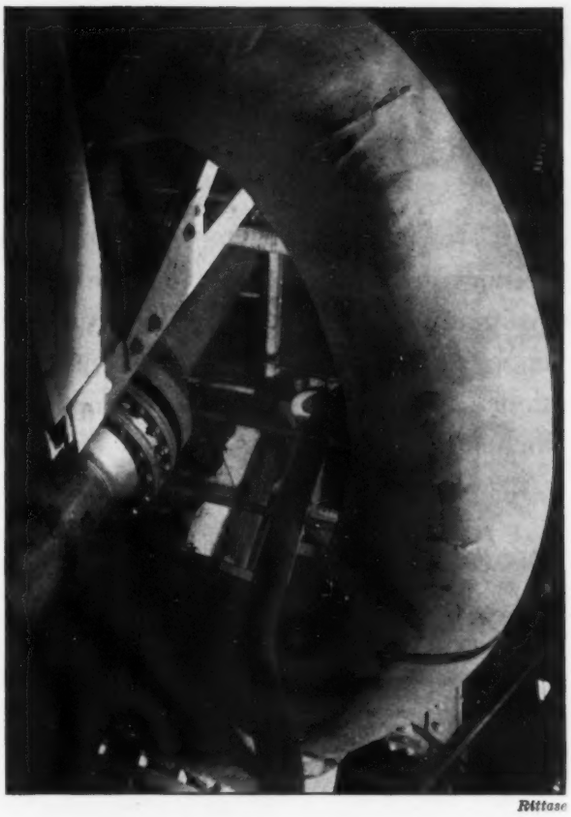
Studies of the causes of corrosion in steam boilers and the means by which it may be prevented are still being made. In such studies two conditions are encountered which, to a certain extent, act as handicaps. The first of these is that the constants of a boiler water as determined at room temperature and at atmospheric pressure may be wholly different from what they are when the water is in the boiler under high pressure and at high temperature. The second condition is that waters which are noncorrosive at room temperatures and atmospheric pressure may be highly corrosive when they are inside the boiler under boiler conditions. For instance, a water which shows zero oxygen by the Winkler test may be corrosive at boiler temperature and pressure.

Deposits on the blades of steam turbines have always been objectionable by reason of the loss in efficiency caused thereby and the difficulty and expense of removing the deposit. It has recently been determined that caustic soda carried over in the steam from the boiler is the cause of these deposits. A limited amount of boiler water as such passes out from the boiler drum into the superheater along with the steam in the form of priming. This water is first evaporated into steam and the whole mass of steam is superheated. Any mineral salts in the priming are changed into a dry powder or dust, which by themselves would not adhere to the turbine blades or cause trouble. However, any caustic soda in the priming becomes thickened to a sticky syrup which adheres to the blades and serves to catch and retain the dry mineral salts passing in the steam.

Use of combustion-control equipment has been greatly extended during the last year. The tendency is to make these devices more simple in construction and in principles of operation. When trouble does occur with control equipment, as it is bound to do at times, the easier it is to locate and remedy the source of the trouble, the more desirable it is. Therefore the simpler the apparatus, the more it will appeal to the average fireman.

Control units are available for single boiler installations, as small as 200 hp.

As predicted in former reviews, geared-motor speed reducers are finding wide application in textile mills, and variable-speed equipment is being further developed. Control of the latter can be mechanical, electrical, or hydraulic; manual or automatic; near or remote. In one of the latest motorized variable-speed units, the speed can be adjusted to any desired point over a wide range and while the unit is in operation if so desired. When the unit is stopped, the speed-changing device automatically returns to the low-speed point for restarting, again accelerating to the desired speed when operation is resumed. In this way, starting power is reduced and torque increased.



Rittase

Early in the year announcement was made of the development of a d-c. series type motor to operate on an a-c. circuit. Such operation is made possible by the use of an electron tube. The speed is independent of the frequency of the supply circuit, can be varied over a wide range, and—if the current is interrupted for any reason—the motor will again resume on the return of current without drawing excessively from the line. The efficiency of the motor is high.

Several marked improvements have been made in the fabrication of rubber belting and in the methods of splicing. A process of continuous vulcanizing has been developed which eliminates a heretofore objectionable feature of the old method, the double vulcanizing at the unions. One objection to the use of rubber belts has been the difficulty of making them endless. This is now overcome by the use of a special form of splice and with the aid of a portable vulcanizer. The time required to make a joint varies from ½ to 3 hours, depending upon the size of the belt.

Proponents of the modern group drive have been active during the year in pointing out the advantages of this method of power transmission. One novel means adopted by the Mechanical Power Engineering Associates to popularize this type of drive is a traveling demonstration unit set up to illustrate the difference in power-transmission costs between unit drives and modern group drives. This unit was shown at the Southern Textile Exposition and at various mills throughout the country.

### *Air Conditioning and Heating*

Use of small unit heaters for detached and localized heating is being widely extended. Two marked advantages of these units are the extreme flexibility and adaption to automatic control. Closely allied to these is equipment for air-conditioning. Much attention is now being given to the removal of fog and steam in dyehouses. Among others, two special methods are being used successfully. In one, the hot, moist air is drawn through cold water by units scattered throughout the room; the air is cooled and the visible vapor is removed, thus drying the air which is discharged back into the room. In another type of equipment, the steam-laden air is passed through a solution of a dehydrating agent, or over the same substance in dry lump form, which removes the moisture.

Greater attention than ever before is being given to lubrication problems. Not only is intensive research being carried on in the laboratory, but a large force of trained service men is being maintained by various oil companies. Lubricating oils are available today in a multitude of blends, gravities, and viscosities, each product being adapted to its own special field of use. The oil companies are rendering a real service to industry by reducing outages, increasing production, and lessening costs of operation of equipment. Grease lubrication is also making great progress. By means of special fittings and the gun method of application, the lubricant can be directed to the very spot where it is needed without unsightly and costly waste.

There is a growing realization on the part of textile executives that proper and ample lighting in their mills means increased production, better products, and less fatigue of the workers. Particularly is the value of adequate lighting in detecting imperfections being more fully recognized. Mercury-vapor lamps in the newer forms, both the straight vapor type and the combination type which gives a daylight illumination, are finding increased use. In these types of lamps there is a considerable increase of lumens per kilowatt over the incandescent lamp, which is a marked advantage. Transformers are available that are filled with a new non-flammable, non-explosive medium which offers far less fire hazard than does the old-style, oil-filled unit.

Many new ideas in valves have found useful application. Valve bodies in small sizes for heavy pressures are machined from solid steel bars. Reducing valves are made in stream-lined pattern, in which the steam, air, or gas being passed moves in a straight line through the valve. Plug-type valves are giving excellent service—particularly where there is a tendency for wire-drawing or seat and disk cutting—and are finding favor for use on water-column blow-offs and similar connections. A new duo blow-off valve for very high pressures is offered in which the two valves have a common body.

Working in conjunction with the Textile Foundation, officials of the School of Engineering of the University of North Carolina are conducting a world-wide survey to learn just what is being done toward the purification and disposal of textile mill wastes and what is the attitude of mill managements in the matter. A report based on this survey will be issued by the Textile Foundation, and this should be of great value later when the subject demands more attention from mill engineers.

# MACHINERY SALES

## *In 1935 17% over 1934 and only 26% below 1929*

**◆ In 1929 TEXTILE WORLD started an annual survey of sales of textile machinery and accessories; consequently the record covers the depression and the recovery period to date. It is based on the cooperation of the equipment manufacturers who send, in confidence, information on the change in their dollar volume to be incorporated into a total . . . The 1935 instalment appears below.**

SALE of textile machinery continued in 1935 its comeback from the depths to which it descended during the depression. TEXTILE WORLD'S survey discloses that:

1. Dollar volume of sales in 1935 was 17% greater than that of 1934 and 32% above 1933. On the basis of the 1933 Census of Manufactures, this means that last year's sales of textile machinery, parts and attachments approximated $79,000,000 as against $67,000,000 in 1934 and $60,000,000 in 1933.

2. The 1935 volume was only 26% below the 1929 level, and was in fact the highest year since 1929. It was 90% higher than the low mark in 1932.

3. Based on 1929 as 100 the following table of index numbers shows the trend from that year to date:

| | |
|---|---|
| **1929** | **100** |
| **1930** | **67** |
| **1931** | **57** |
| **1932** | **39** |
| **1933** | **56** |
| **1934** | **63** |
| **1935** | **74** |

[Each year we feel it necessary to point out that this is a *trend* study only, and that the exact mathematical accuracy of the indices cannot be guaranteed. However we have had ample checks in recent years to indicate their approximate accuracy.]

This year, although most companies reporting were reasonably close to the general average, there were a few distortions: companies which were sharply above or below the mean.

Breaking the industry down into its major groups, manufacturers of preparatory, spinning and weaving equipment averaged 10½% up on 1934; knitting machine manufacturers showed a 16% increase; the bleaching, dyeing and finishing machinery group was 33% up; and firms selling auxiliary equipment to textile manufacturers, as well as accessories and supplies, increased by 11%.

### *The Optimists Have It*

In no other year since we started this survey in 1929 has there been such an overwhelmingly optimistic attitude revealed by sellers of textile machinery and supplies. Of those who expressed themselves on the 1936 outlook, 86% anticipate improved sales, 7% expect a falling off, and 7% can't quite make up their minds about it. Where our correspondents expressed their optimism in terms of actual percentage increase expected, these averaged to something better than an 11% improvement in dollar volume forecast for 1936.

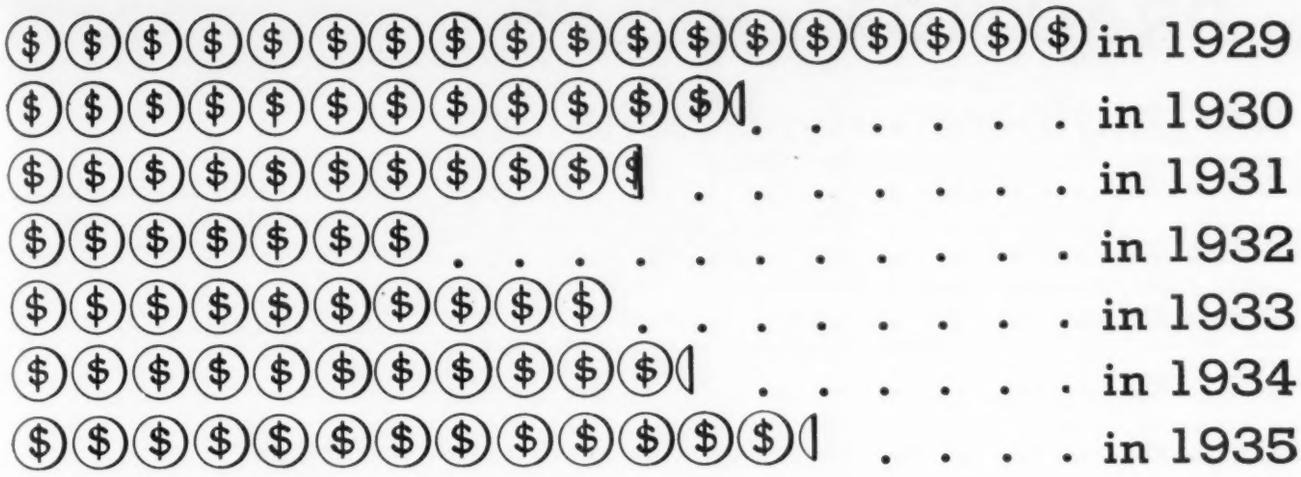
It is significant that many firms referred to excellent business on their books now . . . . . "We go into the year 1936 with substantially more machinery on our books than we had the first of 1935, and we look for a larger volume for 1936" . . . . . "1936 has started off at a brisker pace than 1935 and we are planning on a further improvement of 10 to 15%" . . . . . "January 1936 sales exceed those of any month of 1935, so we can but conclude a much better volume prospect in 1936" . . . . . Those are sample observations.

Of course, the Administration gets publicity of a sort in these opinions on the future. Here are a few typical comments: "Unless the Administration can be completely changed next autumn, we may as well make definite plans to establish ourselves elsewhere" . . . . . "We think business will continue to increase in spite of the Roosevelt threat" . . . . . "Conditions should continue to improve if the Government follows its promise to adopt a 'hands off' policy" . . . . . "If there is no radical legislation and if business is left alone, we have every reason to believe that 1936 will show an increase over 1935 of possibly 5% or 10%" . . . . . "It is my opinion that we shall have no good stable business until we are able to clean out the crowd in the great American Moscow who are now running the Government as a burlesque show" . . . . . "The capitalistic system is one thing and the socialistic system is another and we must realize that they do not mix any more than oil and water but we must take one or the other" . . . . . And not a single letter gave the Administration even a mild boost.

### *Modernization the Theme-Song*

Once more, the central theme of most of the letters received was modernization: the importance of replacing worn-out or obsolete equipment if the individual manufacturers are to prosper. Sample comments are given below:

► "Continued textile activity should certainly result in considerable machinery replacement and modernization which has been lagging for the past few years. Obsolete equipment is a drag on mill profits. Furthermore, to whatever form the present 'social security' legislation may be changed, it can probably be regarded as a permanent fixture, and labor-saving machinery and methods




should certainly be looked to as the obvious way to offset the resulting increased cost of labor."

▶"We believe that in New England particularly the manufacturers have become aware of the advantages to be derived from modern, labor-saving equipment and feel that the next five or ten years should see more business placed with the textile machinery manufacturers than for many years past."

▶"The writer from his conversations with mill owners and manufacturers, and from general observation and studies of business history economics, and observations of physical condition inside plants, feels that we are going to see a tremendous replacement business before very long, and the men who get out and get after it in an intelligent up-to-date way, are going to get that business."

▶"The necessity for replacing machines that can be no longer repaired or rebuilt profitably, and the trend toward the adoption of machines of metal construction throughout convinces us there is much business to be done."

▶"We feel that there is still a tremendous amount of equipment which will be replaced with new at an early date if business conditions continue to improve. We know definitely from actual experience that many mills are still operating with equipment which under normal conditions would have been replaced. During the depression years, they have almost without exception made equipment operate without spending anything on repairs or renewals until absolutely forced to. Therefore, we feel that as soon as full confidence in the future is restored, these mills will be willing to spend the necessary money to bring their equipment up to a point they formerly kept."

▶"The textile trade shall expect refunds on processing taxes paid under protest and a good use of those funds, if collected, will be investments in modernization, thus a good 1936 prospect. As has applied in recent years, created 1936 sales shall apply to going established properties—no new mills if the trade is wise."

▶"While we are making progress slowly in selling the trade on the idea of modernizing their equipment, we cannot avoid the fact that many old machines are still running and with some success. Furthermore, many of our customers have depleted their reserves to such an extent that they could not afford to buy machinery. Until the manufacturer can see a possible profit and accumulate a certain amount of reserve, we will probably not experience any decided increase in machine sales."

▶"The mills have all had good business and ought to spend more money this year than they did last year for bringing their equipment up-to-date. It is a serious commentary that some of the most successful mills in the United States are running our equipment made over 50 years ago. We are unable to tell you whether it reflects on the mills or on our selling ability—at any rate it casts no reflections on our machinery."

▶"Our information through contacts with mills indicates that they are all thinking of new and improved machinery, and it is our opinion that there will be more new equipment bought this year than has been bought in a number of years unless there is some unexpected setback to the textile industry during the early part of the year."

▶"I consider the outlook much more favorable than a year ago. The reason for this is that I think the general situation of the country is on a more substantial basis than a year ago. This, in turn, I think is due primarily to the fact that the durable goods industries have got under way at last. This means that the need of the country in the way of machinery replacements is being appreciated in a broad way. This feeling is bound to extend to the textile mills, where the need of new machinery is great, indeed greater than in many other lines of industry."

▶"We enter 1936 with a very optimistic frame of mind. We don't expect to run wild, but we do expect to see a healthy increase in business, and such an improved general volume that all of the machinery builders will be kept busy. This in itself is almost an insurance of increased prices, in that everyone will be running steadily. Consequently, there will be less tendency to price cutting than in previous years."

And as a last line, there is the following:

"If the textile trade doesn't go hog-wild and make a general slashing of prices on their product, we would be willing to gamble that our increase of business booked for 1936 would be equal to and perhaps better than the increase shown this year over 1934." (And in this case the 1935 increase over 1934 was 42½%.)

# PRACTICAL HELPS for Engineers and Mechanics

FAULTY LUBRICATION is often due to the use of the wrong type of grease. Lime-soap grease is not affected by water and should be used on wet-finishing machinery where water is likely to get in the bearings. Soda-soap grease contains no water and should be used when the grease is subjected to high temperature, to severe agitation, or to high centrifugal force.

▼

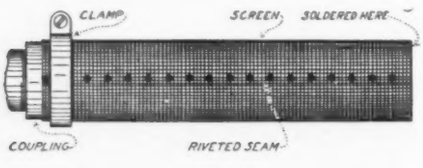
NEXT IN IMPORTANCE to the installation of modern lighting equipment is the cleaning of light reflectors. Absorption of light by dirty reflecting surfaces on reflectors has never been given enough consideration. A decrease of from 30 to 50% in the foot-candle intensity usually results before the loss is noticeable. A periodic checking with a foot-candle meter will assist in preventing the intensity from falling below a fixed value.

▼

REPLACEMENT OF plain cast iron bearings on cotton spinning frames with anti-friction bearings is well worth while. Such an installation in a New England mill resulted in a total saving per spinning frame of $64.10 per year. The initial cost of the anti-friction bearings was under $50 per frame.

▼

RUGGED, durable, fine-mesh, Monel-metal wire cloth makes an oil



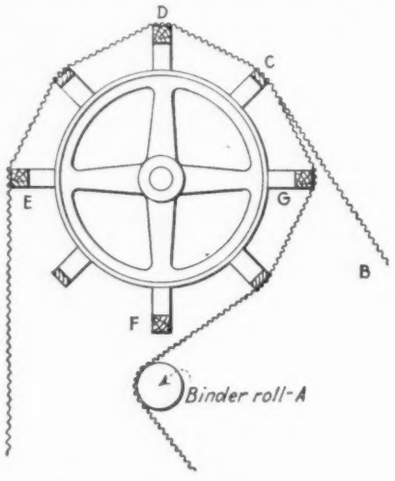

strainer which is superior to the old-fashioned perforated-pipe type. Monel metal solders readily, can be fastened into place easily and securely, and is cleaned quickly.

These items were culled from the 1935 issues of TEXTILE WORLD.

A QUICK METHOD for closing holes in castings is by means of babbitt metal. Simply place the broken part in a box of sand. Push away enough of the sand from the edge of the hole so that the babbitt will securely clamp around both sides. Then pour in the babbitt. If you have no babbitt, use lead or similar metal with a low melting point. Welding, of course, is better, but for temporary work this method serves very well.

▼

APPLICATION of a binder roll as at *A* in the sketch will make a bleach-house reel pull much better than if the pull is direct as on line *BC*.



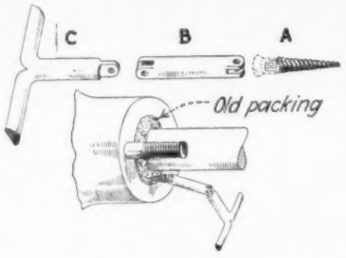

The added pulling power more than makes up for the friction added by the extra bearings, particularly if these are of the anti-friction type. Slatted reels will pile more evenly into a squeezer tub or slack box if some of the slats are 1 or 2 in. higher than others, as shown at *D*, *E*, *F*, and *G*. Such reels impart an oscillating motion to the cloth and lay it somewhat more evenly.

▼

TO DETERMINE whether a given steam engine is properly lubricated, pull out your watch, shut off the steam, and find out how long it takes the engine to come to a stop. Naturally the longer the better. By noting the stopping time every night, and by altering the quantity of lubricant fed to the engine every day, you can determine the proper quality and quantity of lubricant.

▼

A SIMPLE, universal-jointed, packing screw for hard-to-get-at packing on pumps or piston-rod packing boxes can be made from a coarse-thread, large-size, wood screw and a couple of pieces of cold-rolled, round rod




about the same diameter as the body of the screw. Two flat sides are filed on the screw head as shown at *A*. A shank, as at *B*, slotted and drilled for a tee handle, as at *C*, is made by sawing, splitting, and bending. The pieces put together with pins complete the tool.

▼

IN THE POWER PLANT of a finishing mill, the returns from several dryers, a water-heating system, and other equipment were led into two closed tanks and discharged from them directly by two duplex pumps. Every time any one of the dryers was started up, the feed pumps would become noisy and vibrate, due to a flood of cold water coming into the return tanks from the dryer and creating a vacuum. This was remedied by installing an expansion trap between each dryer and its bucket trap. When a dryer cools off, its expansion trap opens to the sewer and remains open until the returns are up to a certain temperature.

▼

IT IS NOT TRUE that high-pressure steam is much better for process use than low-pressure steam. Measured above 32° F., the heat in 1 lb. of steam at 100 lb. gage pressure is 1,189 B.t.u. At 5-lb. gage pressure it is 1,156 B.t.u. If operating conditions give a condensate temperature of 200° leaving the process, the heat given up by 1 lb. of steam at 100-lb. gage pressure is 1,021 B.t.u., while the corresponding figure for 5-lb. pressure is 988 B.t.u. The difference is only 3½%.